Econ 101: Midterm Review - Solutions

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1 Principles

1.1 Definitions

- **Scarcity**: In Economics it is impossible to have everything. Therefore, the agents need to take decisions
  - Ex.: The day has only 24 hours
- **Tradeoff:** It is the concept of decision in economics.
  - Ex.: going to the class X staying at home
- **Opportunity Cost:** everytime the agent make a decision he abdicates from other possible outcome. This s the opportunity cost.
  - Ex.: If one student decides to go to the class, the opportunity cost was to stay at home
- **Cost-Benefit Analysis:** When making a decision the individual should address all benefits and costs
  - Benefits of going to the class: Learning
  - Cost of going to the class: Walk to the the university
- **Marginal Principle:** In economics, we should think unit by unit.
  - Ex.: When someone is lost in the desert she prefers water to diamonds. However, when she has plenty of water available, she opts for diamonds

1.2 Questions

1. According to diminishing marginal utility, which of the following people would gain the lowest marginal benefit from an extra $100 of income?

   (a) Ariana, an actress with an annual household income of $1,500,000

   (b) Shawna, a single mother of three young children with an annual household income of $19,000

   (c) Devin, head of a three-person household with an annual household income of $120,000

   (d) Chin, a single person with an annual household income of $20,000

2 Demand, Supply and Equilibrium

2.1 Definitions

Demand:

- Price: Cost of buying a good
- Demanded Quantity: Benefit of having the good
- Law of Demand:
  - Higher Prices ⇒ Lower Quantity Demanded
  - Lower Prices ⇒ Higher Quantity Demanded
- **Be careful:** Quantity Demanded $\neq$ Demand

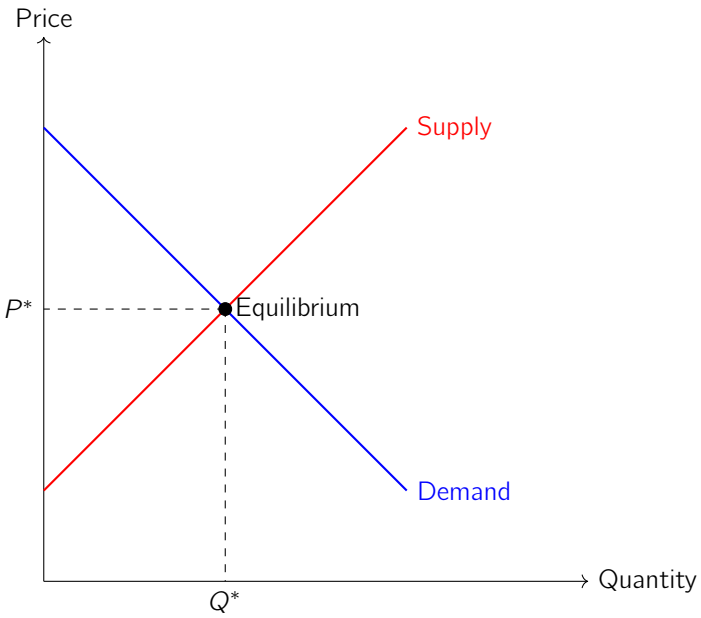
Supply:

- Price: Benefit of selling a good
- Supplied Quantity: Cost of producing the good
- Law of Supply:
  - Higher Prices ⇒ Higher Quantity Supplied
  - Lower Prices ⇒ Lower Quantity Supplied
- **Be careful:** Quantity Supplied $\neq$ Supply
- Substitute goods:
  - Increase in prices of good 1 ⇒ Lower quantity demanded for good 1 ⇒ More people want to buy good 2 ⇒ Higher prices for good 2
- Complementary goods:
  - Increase in prices of good 1 ⇒ Lower quantity demanded for good 1 ⇒ Lower quantity demanded for good 2 ⇒ Lower prices for good 2

Equilibrium: Demand = Supply

2.2 Graph

- The Law of demand imply a negative relation between prices and the quantity demanded (**Decreasing line**)
- The Law of supply imply a positive relation between prices and the quantity supplied (**Increasing line**)



- Both curves can shift (for the left or for the right):
  - Common shifts on the demand:
    - Increase/Decrease in Income
    - Increase/Decrease in prices of substitute goods
    - Increase/Decrease in prices of complementary good
  - Common shifts on the supply:
    - Increase/Decrease in inputs prices
    - Production shock. Ex.: Rain destroyed one of the production plants
  - **Be careful:** Shifts in both supply and demand can lead to situations where its not possible to identify what happens to prices or quantity in the new equilibrium
- **Shifts Road map:**
  1. This shock affects supply or demand?
  2. The curve will shift for the right or left side? (Sometimes is easier to think if the prices are going to increase or decrease)
  3. After the shift what happens in the new equilibrium? (Quantity increased or decreased? What about the prices?)

2.3 Math

- important formulas:
  - Demand: $P^D = b - a * Q$
  - Supply: $P^S = b + a * Q$

- How to find a? Let (P_1, Q_1) and (P_2, Q_2) be two points

$$a = \frac{P_1 - P_2}{Q_1 - Q_2}$$

- How to find the equilibrium
  1. $P^S = P^D$
  2. Find Q^*
  3. Substitute Q^* in the demand or in the supply to find P^*

2.4 Questions

1. Suppose we have this system: $P = 28 - 2Q$ and $P = 8 + 3Q$. What is the equilibrium price?

$$28 - 2Q = 8 + 3Q \Rightarrow 20 = 5Q \Rightarrow Q^* = 4$$

$$P^* = 8 + 3 * 4 = 20$$

2. Which of these would NOT cause a rightword shift (out) of the supply curve for a good?
   (a) a fall in an input price
   (b) an increase in the number of sellers
   (c) an expectation that the product will go out of style in the near future
   (d) an increase in price caused by a shift in demand

3. Suppose supply for a good shifts back a little, while demand shifts out A LOT. What do you think would happen to equilibrium price and quantity?
   (a) Both would fall
   (b) Both would rise
   (c) Price would rise but quantity would fall
   (d) Price would fall but quantity would rise

3 Elasticity

3.1 Definitions

- Price-Elasticity of the Demand: How changes in prices affect the quantity demanded

$$\epsilon = \frac{\%\Delta Q}{\%\Delta P}$$

$$\text{where } \%\Delta Q = \frac{Q_2 - Q_1}{\bar{Q}},\ \%\Delta P = \frac{P_2 - P_1}{\bar{P}},\ \bar{Q} = \frac{Q_1 + Q_2}{2},\ \bar{P} = \frac{P_1 + P_2}{2}$$

  - If $|\epsilon| < 1$ - Inelastic

- If $|\epsilon| > 1$ - Elastic
- If $|\epsilon| > 1$ - Unitary
- The value of the elasticity is influenced by the amount of substitute goods available

- Cross-Price Elasticity: Q_1 quantity good 1, P_2 price good 2

$$\epsilon = \frac{\%\Delta Q_1}{\%\Delta P_2}$$

- $\epsilon > 0$ - Substitutes
- $\epsilon < 0$ - Complements

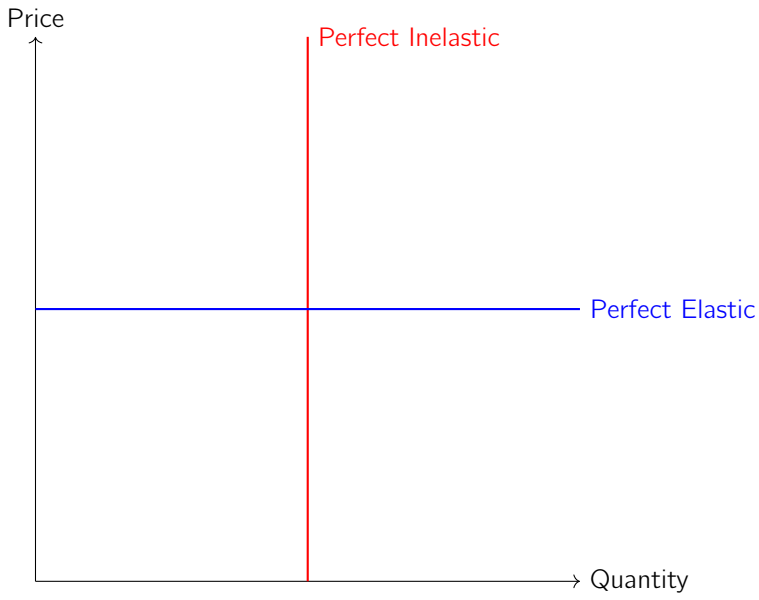
- Income Elasticity of the Demand: I is the income

$$\epsilon = \frac{\%\Delta Q}{\%\Delta I}$$

- $\epsilon > 0$ - Normal
- $\epsilon < 0$ - Inferior

3.2 Graphs

- Perfect inelastic or elastic (This is valid for both supply and demand)



- More Vertical ⇒ More Inelastic
- More Horizontal ⇒ More Elastic

3.3 Questions

1. Suppose Demand: $P = 48 - 4Q$. If price rises from 8 to 16, what is the elasticity of demand?

1. Finding the Quantities

$$P_1 = 8 \Rightarrow 8 = 48 - 4Q_1 \Rightarrow 4Q_1 = 40 \Rightarrow Q_1 = 10$$

$$P_2 = 16 \Rightarrow 16 = 48 - 4Q_2 \Rightarrow 4Q_2 = 32 \Rightarrow Q_2 = 8$$

2. Midpoints:

$$\bar{Q} = \frac{10+8}{2} = 9 \tag{1}$$

$$\bar{P} = \frac{16+8}{2} = 12 \tag{2}$$

(3)

(4)

3. $\%\Delta Q$ and $\%\Delta P$

$$\%\Delta Q = \frac{Q_2 - Q_1}{\bar{Q}} = \frac{8-10}{9} = -\frac{2}{9}$$

$$\%\Delta P = \frac{P_2 - P_1}{\bar{P}} = \frac{16-8}{12} = \frac{2}{3}$$

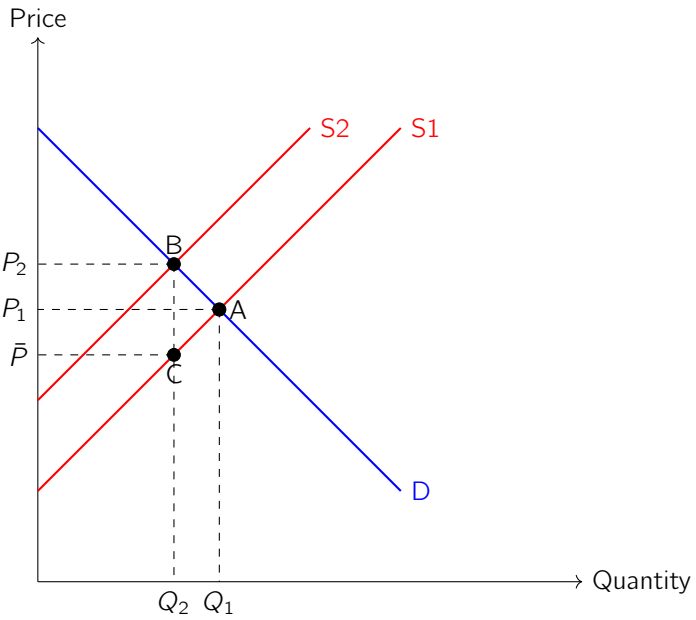
4. Elasticity:

$$-\frac{2}{9} * \frac{3}{2} = -\frac{1}{3}$$

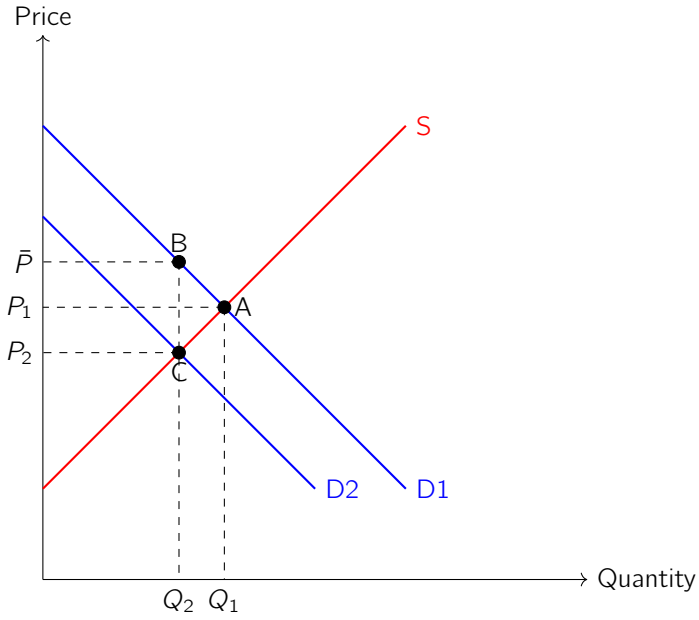
4 Taxes

4.1 Graphs

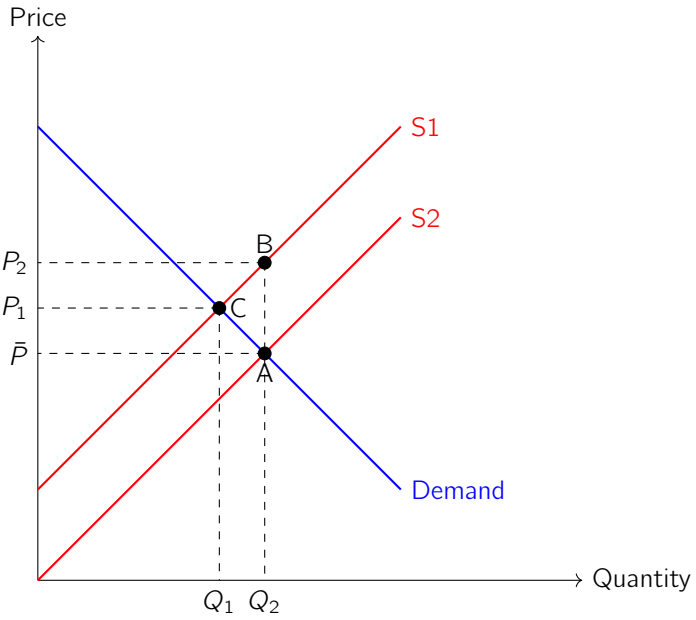
Taxes on Supply



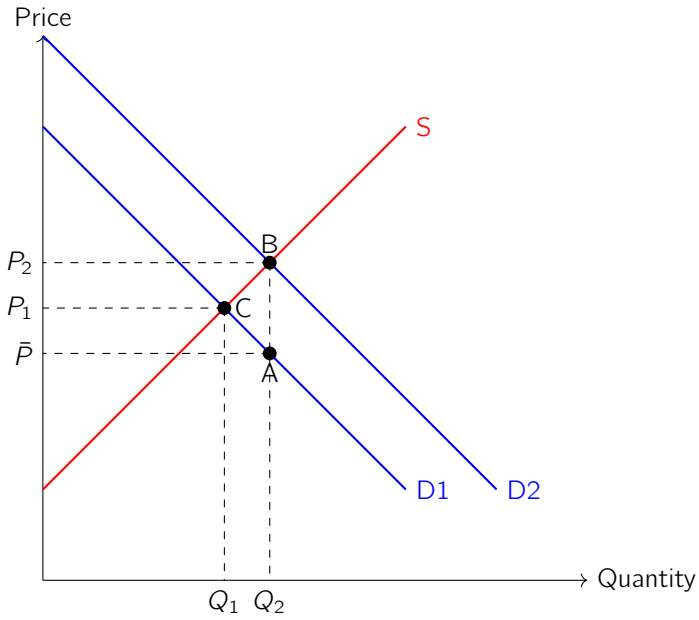
Taxes on Demand



Subsidy on Supply



Subsidy on Demand



4.2 Math

- Dead Weight Loss (Area of the Triangle ABC) - This formulas are for the case of Taxes on Supply, the other cases are analogous

$$\frac{(P_2 - \bar{P}) * (Q_1 - Q_2)}{2}$$

- How much the consumers pay for the Tax:

$$(P_2 - P_1) * Q_2$$

- How much firms pay for the Tax:

$$(P_1 - \bar{P}) * Q_2$$

- Government Revenue:

$$(P_2 - P_1) * Q_2$$

- **Be careful: Inelastic side always pays more**

4.3 Questions

1. Sellers bear a smaller incidence of a tax when:

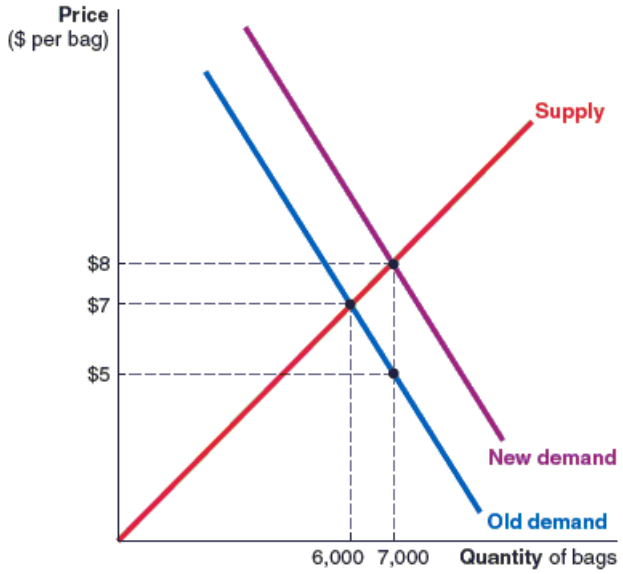
   (a) the tax is higher.

   (b) supply is more elastic relative to demand.

   (c) demand is more elastic relative to supply.

   (d) demand is perfectly inelastic.

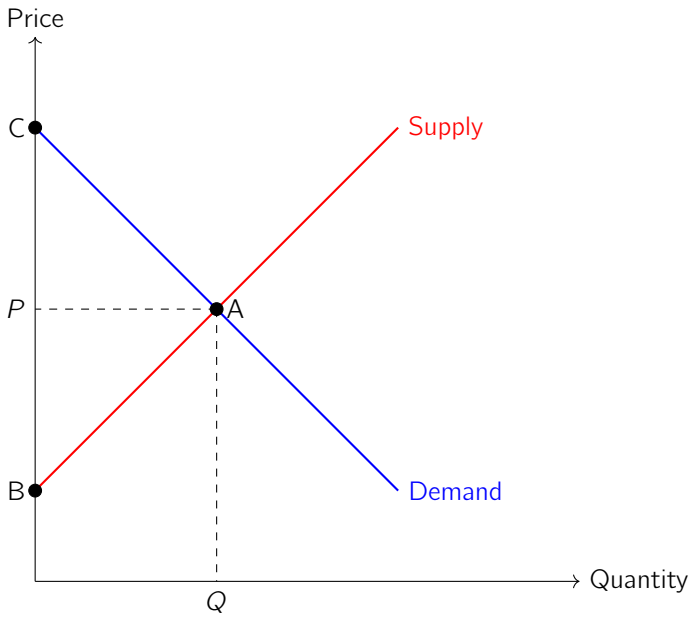
2. Refer to the market for reusable jute shopping bags that is shown in the figure. The original equilibrium price is \$7 per bag. A subsidy is now introduced for buyers of the bags. The amount of the subsidy is \$:



$8 - 5 = 3$

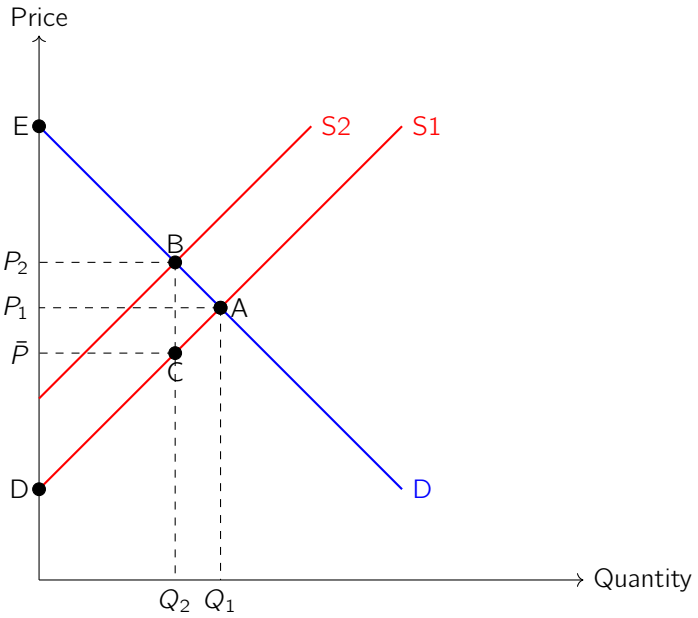
5 Welfare

5.1 Graphs



- Consumer Surplus: Triangle APC
- Producer Surplus: Triangle APB
- Total Surplus: Producer Surplus + Consumer Surplus or Triangle ABC

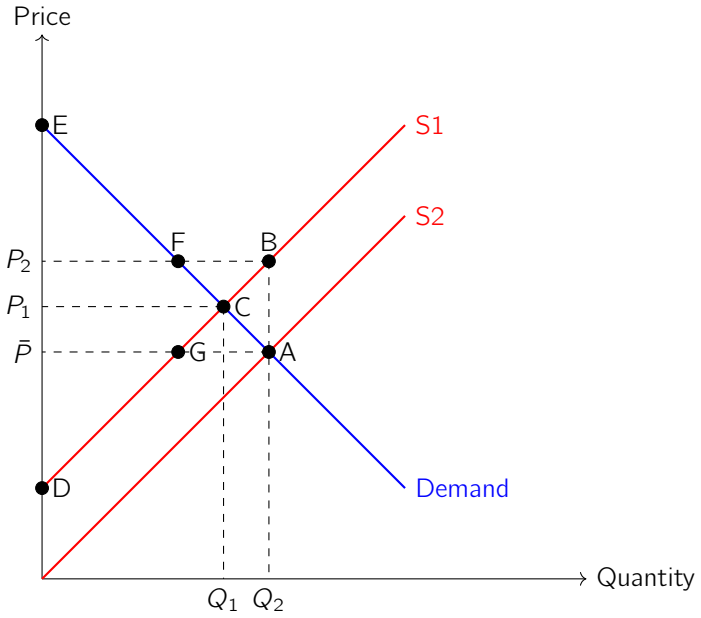
5.2 Example: Tax on the Supply



- Consumer surplus:
  - Moment 1: Triangle AP_1E
  - Moment 2: Triangle BP_2E

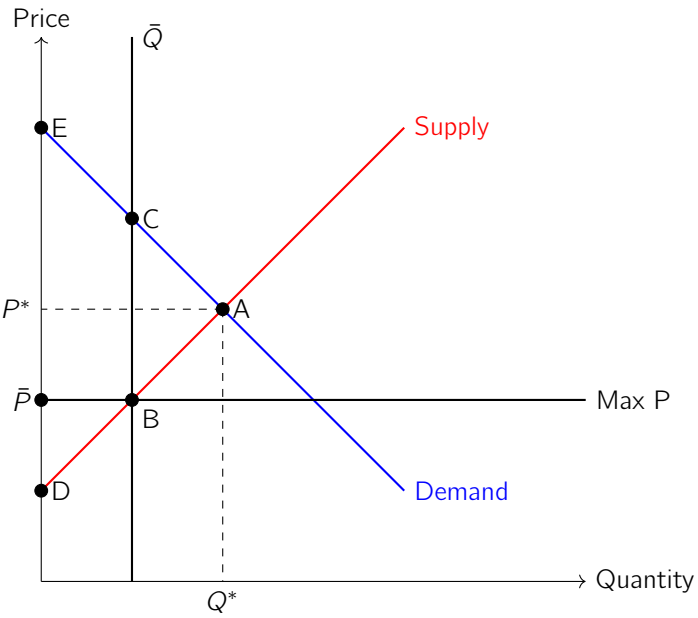
- Producer Surplus:
  - Moment 1: Triangle AP_1D
  - Moment 2: Triangle $A\bar{P}C$

5.3 Example: Subsidy on the Supply



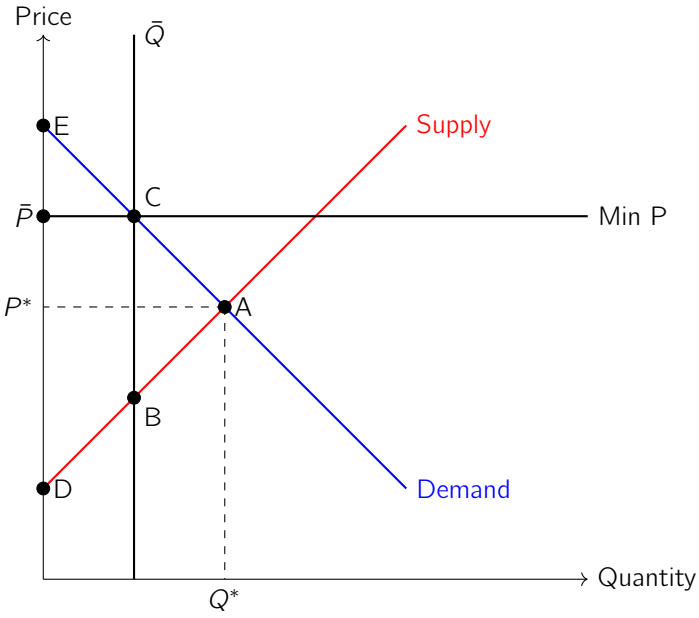
- Consumer Surplus: Consumers are buying Q_2 for price $\bar{P}$. Hence, the Consumer surplus is the triangle $E\bar{P}A$
- Producer Surplus: This is more complex. Here we are making an assumption that the subsidy happens at the moment of the purchase. In other words, the government is not affecting the cost of production. That's why we use S_1 as a reference for the producers and S_2 for the demand
  - Since the cost structure is the same (The government is not subsidizing the production but the purchase) We use S_1 for calculating the production surplus
  - Production Surplus: Triangle BP_2D
- Government Cost: Rectangle $ABP_2\bar{P}$
- **Be careful:** Note that the Consumer Surplus and the Producer surplus overlay. However, they only overlay in an area that there was already surplus for the producer or the consumer before the subsidy.
  - That is, even though the area given by $CFP_2\bar{P}G$ is counted twice when we discount the government cost this will be counted only one time in the New total surplus that is the same value as in the situation without the subsidy.
- Dead Weight Loss: Triangle BCA

Price Ceiling



- New Consumer Surplus: Area $ECB\bar{P}$
- New Producer Surplus: Triangle $\bar{P}DB$
- Dead Weight Loss: Triangle ABC

Price Floor



- New Consumer Surplus: Triangle $EC\bar{P}$
- New Producer Surplus: Area $C\bar{P}DB$
- Dead Weight Loss: Triangle ABC

5.4 Price ceiling and Price Floor

5.5 Math

- **Roadmap**

1. Identify Supply and Demand
2. Find P_0^D and P_0^S
   - Assume $Q = 0 \Rightarrow$ Plug in the Demand $\Rightarrow$ find P_0^D
   - Assume $Q = 0 \Rightarrow$ Plug in the Supply $\Rightarrow$ find P_0^S
3. Find the Equilibrium - P^* and Q^*
4. Consumer Surplus: $b = Q^*$, $h = P_0^D - P^*$
5. Producer Surplus: $b = Q^*$, $h = P^* - P_0^S$
6. Use area of the triangle

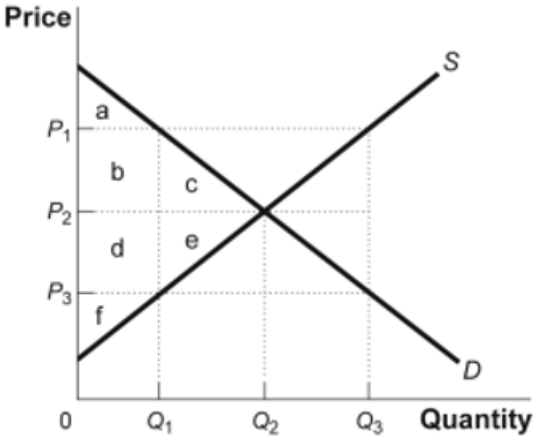
$$\frac{b * h}{2}$$

7. Total Surplus = Consumer Surplus + Producer Surplus

5.6 Questions

1. What area represents consumer surplus if there is a binding price floor at P1?

Figure: The Market for Hybrid Cars



Only *a*

2. An increase in producer surplus would most likely occur if:

   (a) an effective price floor was imposed.

   (b) an effective price ceiling was imposed

   (c) the market price of the good decreased.

   (d) no changes occurred in the market

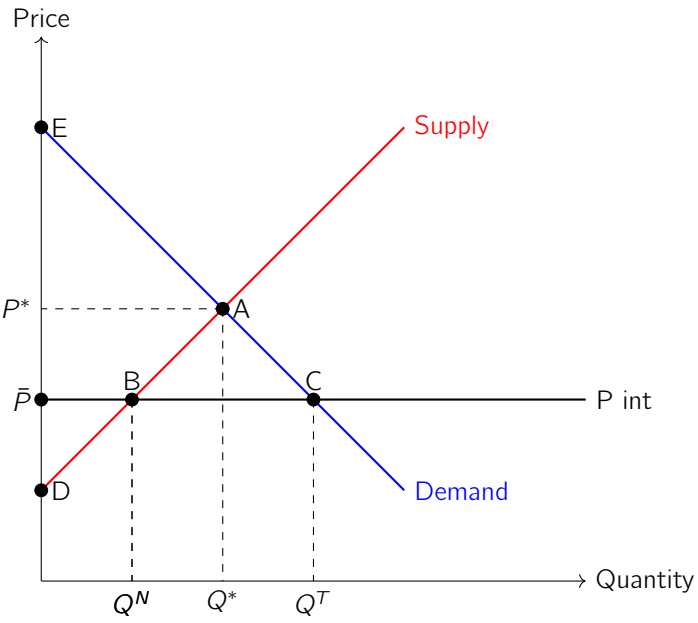
6 Trade

6.1 Concepts

- Absolute Advantages: "Which country can produce more?"
- Comparative Advantages: "Who has the lowest opportunity cost?"

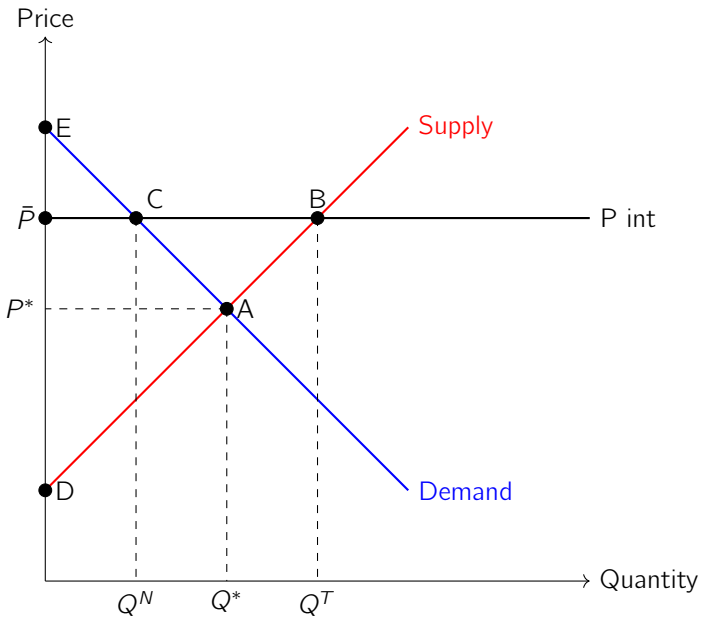
6.2 Graphs

Imports



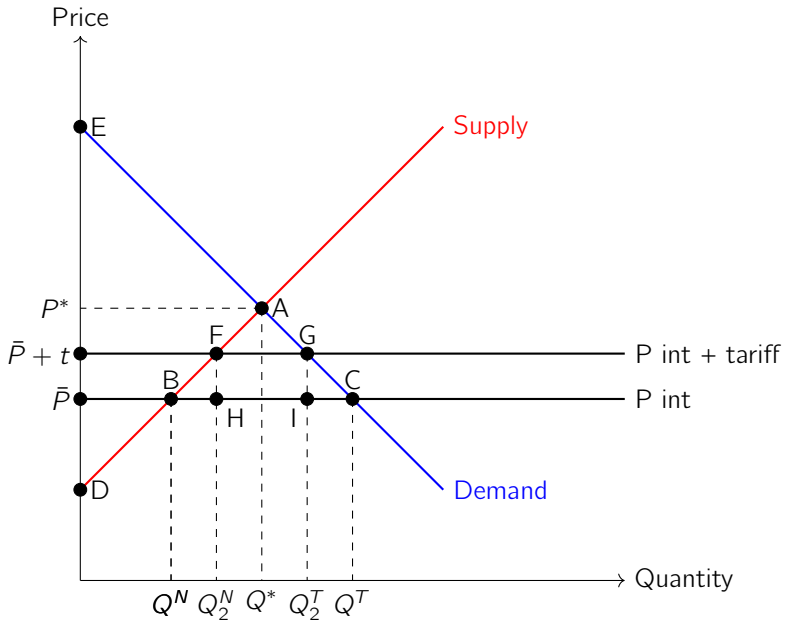
- Imports = $Q^T - Q^N$
- Consumer Surplus: Triangle $E\bar{P}C$
- Producer Surplus: Triangle $CB\bar{P}$

Exports



- Exports: $Q^T - Q^N$
- Consumer Surplus: Trinagle $E\bar{P}C$
- Producer Surplus: Traingle $D\bar{P}B$

6.3 Tariff on imports



- New Imports: $Q_2^N - Q_2^T$
- New Consumer Surplus: Triangle $EG(\bar{P}+t)$

- New Producer surplus: Triangle $DF(\bar{P}+t)$
- Government Revenue: Imports times tariff $\Rightarrow$ Rectangle $FGHI$
- DWL: Triangle BFH + Triangle GIC

6.4 Math - Road map

1. Given the Demand and the Supply find the Equilibrium
2. Given the international Price $\bar{P}$
   - Substitute $\bar{P}$ in the demand to find $\bar{Q}^D$
   - Substitute $\bar{P}$ in the supply to find $\bar{Q}^S$
3. Imports: $\bar{Q}^D - \bar{Q}^S$ or Exports: $\bar{Q}^S - \bar{Q}^D$

6.5 Questions

1. The table provides data on how long it takes Marla and Jason to cook lasagna or chicken curry.

Table: Marla and Jason		
	Hours it takes to cook:	
	Lasagna	Chicken curry
Marla	4	3
Jason	3	1

   Which statement explains who has a comparative advantage in cooking lasagna?

   (a) Marla because she has a lower opportunity cost than Jason.

   (b) Jason because he has a lower opportunity cost than Marla.

   (c) Marla because she can cook lasagna faster than Jason.

   (d) Jason because he can cook lasagna faster than Marla.

   Marla Opportunity cost:

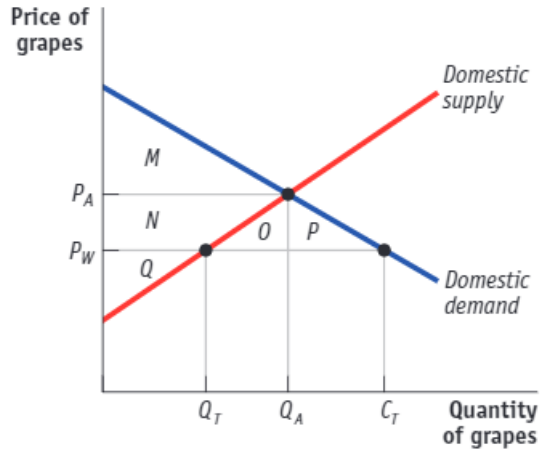
   $$4 \text{ to } 3 \Rightarrow 1 \text{ to } 3/4 \Rightarrow 4/3 \text{ to } 1$$

   Jason Opportunity cost:

   $$3 \text{ to } 1 \Rightarrow 1 \text{ to } 1/3$$

   Therefore, Jason has lower Opportunity cost to cook Lasagna and Marla has lower Opportunity cost for Chicken Curry

2. the price of grapes in California is PA. When the economy is opened to trade, the price falls to PW, and the change in consumer surplus is area:



N+O+P

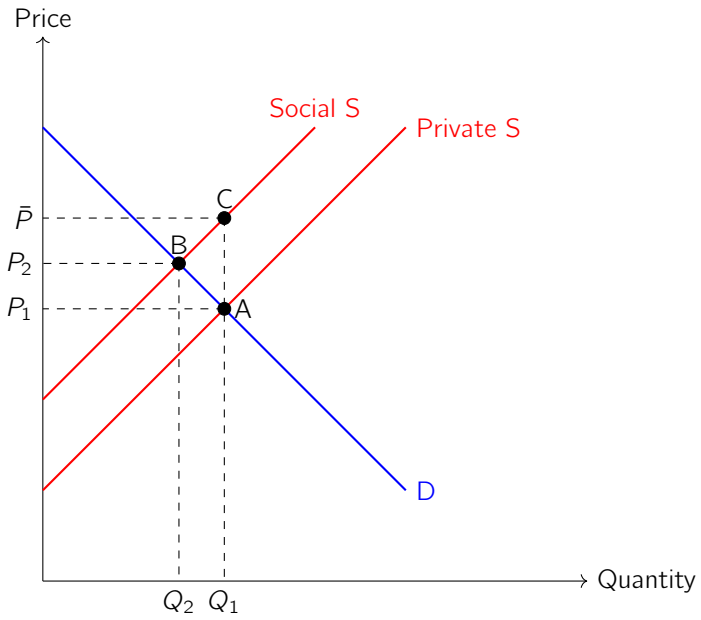
7 Externalities

7.1 Definitions

- Negative Externalities: Social Cost > Private Cost
- Positive Externalities: Social Benefit > Private Benefit
- Coase Theorem: If the property rights are well defined the private agents can find a better solution negotiating instead of requesting the government intervention.
- Rival Good: "The fact that I'm using the good means that nobody else can use it"
- Excludable Good: " I can define a mechanism such that other people does not have access to the good"
- Private Good: Rival and Excludable. Ex.: Clothes
- Common Resource: Rival but not Excludable. Ex.: Fish in the lake
  - Tragedy of the Commons: The good is overused since people prioritize their own benefit
- Club Good: Non-Rival but Excludable. Ex.: Electricity
- Public Good: Non-Rival and Non-Excludable. Ex.: Park
  - Free-rider problem: Someone benefits without paying

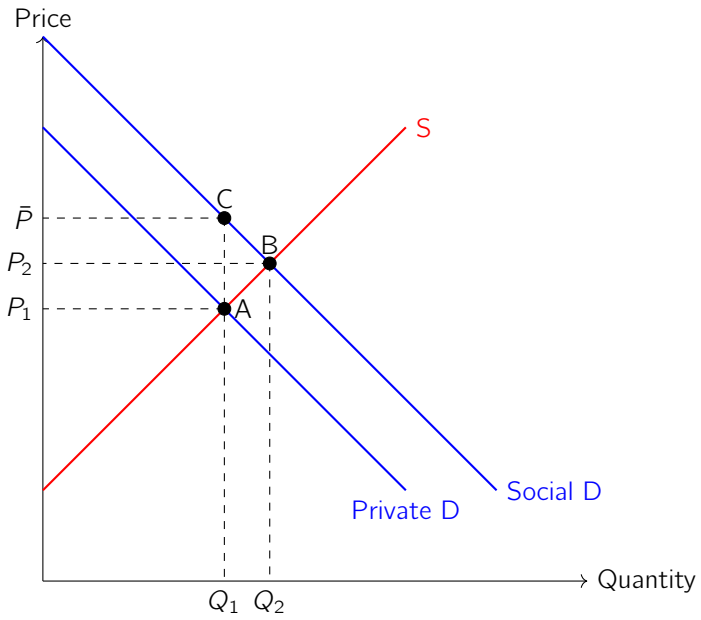
7.2 Graphs

Negative Externality



- Size of the Externality: $\bar{P} - P_1$
- Dead Weight Loss: Triangle ABC

Positive Externality



- Size of the Externality: $\bar{P} - P_1$
- Dead Weight Loss: Triangle ABC

7.3 Questions

1. Which of the following is an example of a negative externality?

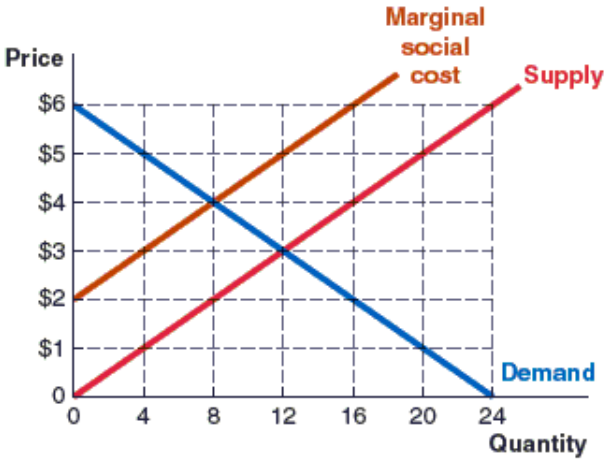
   (a) When Fazio parks his big truck at the grocery store, people in the cars on each side of his parking space have a hard time opening their car doors.

   (b) Bae's company has a decrease in profits when the demand for its product falls.

   (c) Raul loses weight because he wants to feel better, but the weight loss means that he needs new clothes.

   (d) Rita gains weight while she is on vacation because she eats more than normal.

2. The graph shows the marginal social cost, demand, and supply curves in the salad dressing market. In this market, the socially optimal output is _____ , and the market-determined output is _____.



(a) 12; 3

(b) 4; 8

(c) 8; 2

(d) 8; 12

8 Inequality

8.1 Definitions

- Gini Index: Measure the Inequality of a country
  - Value 0 - No Inequality
  - Value 1 - One household has all the income
- Poverty Line: A threshold such that below this value a family is called "poor"
- Poverty rate: Share of the population that is below the Poverty Line
- Absolute Poverty: Base the analysis on a fixed living standard
- Relative Poverty: Base the analysis on the contemporary living standard
- Life Cycle: Young people and old people have lower income
- Social Safety net: A set of policies to help those at the bottom of the income distribution
  - in-kind: Other types of transferst that are not money. Ex.: Medicaid
- Social insurance: Insurance against unemployment, disability or illness
- Progressive tax rate: Richer people pay proportionally more taxes
- Costs and Benefits of redistribution
  - Benefits: Move money to those who value the most

  - Cost: Moving the money is costly

- Tradeoff: Efficiency and Equality
  - Perfect Equality leads to less incentive to work/study (low efficiency)
  - Extreme Efficiency leads to low equality since some people will not have access to safety net

- Ignorance Veil: If you had to choose the income of all agents before being born you would maximize the income of the poorest individual since it could be you

8.2 Questions

1. Which of the following is NOT a correct rationale about why income redistribution programs do not always reduce efficiency?

   (a) Fewer resources may need to be devoted to dealing with crime when incomes are more equal.

   (b) Less concentrated political power may exist when incomes are more equal.

   (c) When incomes are more equal, work incentive grows.

   (d) Worker productivity grows when educational opportunities are widespread.

2. Since 1980, the Gini coefficient for income in the US has risen. What does this mean?

   (a) real income has risen

   (b) real income has fallen

   (c) income inequality has increased

   (d) income inequality has decreased

   (e) the poverty rate has risen

3. Consider the following data. Is the tax system progressive, regressive, or proportional?

Income	Tax
$50,000	$5,000
$100,000	$10,000
$200,000	$20,000

   (a) progressive

   (b) regressive

   (c) proportional

   (d) can't tell from data here