

ECON 0100 | Fall 2024 | Homework C

Due: Friday, October 18

Note: Some of the questions below may not include enough space to answer on this sheet. I'd recommend using a separate sheet.

Q1 (of 4). UK's Lemon Tarts

Economic historians have recounted a long history of the Ministry of Magic's trade policies. At one point the Ministry had fully lifted any trade barriers to exports and imports, with a global price of 12 galleons. However, eventually the Ministry of Magic imposed an import tariff of 1 galleons to pad its coffers, hoping to avoid the political backlash of a domestic tax. The UK domestic supply and demand curves can be represented by the following relationships:

$$D : P_b = 17 - \frac{1}{6}Q_b \quad (1)$$

$$S : P_s = 2 + \frac{2}{3}Q_s \quad (2)$$

Use algebra to illustrate what happened to the market after the tariff was imposed. Note: I'm looking for a complete description of the impacts on the market. Gradescope will guide which types of answers I'm looking for, but it's part of your job to know the relevant components of a complete description of the market.

Q2 (of 4). The Butterbeer Tax

The Ministry of Magic was in some financial trouble after their considerable expenditures during the war. They decided to impose a tax of 2 galleons on the sale of butterbeer as a source of funding. The supply and demand curves for butterbeer can be represented by the following equations.

$$P_b = 20 - \frac{1}{2}Q_b \quad (3)$$

$$P_s = 2 + \frac{1}{2}Q_s \quad (4)$$

Use a graph and algebra to calculate equilibrium before and after the tax. Start with the pre-tax equilibrium. Then use the tax equation ($P_b = \tau + P_s$) to solve for equilibrium quantity and the two prices. Conclude with the remaining relevant components. Note: Like Q1, I'm looking for a complete description of the impacts on the market.

Q3 (of 4). Flummoxed by the Floo Powder Fiasco

Floo Powder is a magical commodity used by witches and wizards to transport themselves through fireplaces to different locations. While it's often convenient, its use is associated with negative environmental effects, including air pollution. The Ministry's Bureau of Economic Analysis has estimated the externality to be 10 galleons with the following supply and demand equations:

$$P_b = 100 - 2Q_b \quad (5)$$

$$P_s = Q_s \quad (6)$$

The Ministry of Magic has hired you to design a policy that corrects the market failure caused by the negative externality of Floo Powder use.

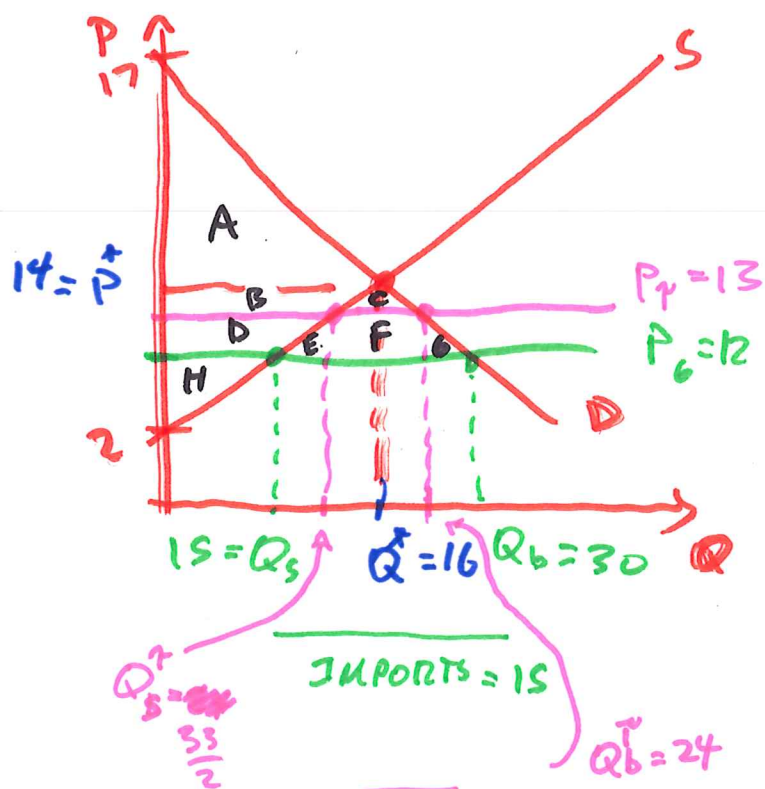
1. Start by using a graph to calculate the market equilibrium.
2. Then calculate the socially efficient quantity.
3. Graph and calculate DWL. No need to discuss other welfare measures.
4. Propose a policy intervention to fix the market failure.
5. Calculate the equilibrium quantity, buyer's price, and seller's price after the policy.

Q4 (of 4). Deadweight Loss Intuition

Which of the following best explains the intuition behind the deadweight loss associated with a negative externality like the one above?

- A) The externality causes the market to produce too much of the good, leading to a surplus and reduced consumer surplus. ~~X~~
- B) The externality causes the market to produce too little of the good, leading to a shortage and reduced producer surplus. ~~X~~
- ☒ C) The externality causes the market to produce at a quantity where the marginal social cost of production exceeds the marginal social benefit of consumption, leading to inefficiency and reduced total surplus.
- D) The externality causes the market to produce at a quantity where the marginal social benefit of consumption exceeds the marginal social cost of production, leading to inefficiency and reduced total surplus. ~~X~~

Q1. Lemon Tarts



$$CS = A + B + C$$

$$PS = D + H$$

$$GOV = F$$

$$DWL = E + G$$

$$= \frac{1}{2} \cdot 1 \cdot (33\frac{1}{2} - 15) + \frac{1}{2} \cdot 1 \cdot (30 - 24)$$

DOMESTIC PRICE

$$17 - \frac{1}{6}Q = 2 + \frac{2}{3}Q$$

$$15 = (\frac{1}{6} + \frac{4}{6})Q = \frac{5}{6}Q$$

$$Q^* = 18$$

$$P^* = 2 + \frac{2}{3} \cdot 18$$

$$= 2 + 12$$

$$P^* = 14$$

PRE-TAX

$$12 = 17 - \frac{1}{6}Q_d$$

$$\frac{1}{6}Q_d = 5$$

$$Q_d = 30$$

POST-TARIFF

$$13 = 17 - \frac{1}{6}Q_d$$

$$\frac{1}{6}Q_d = 4$$

$$Q_d = 24$$

$$13 = 2 + \frac{2}{3}Q_s$$

$$11 = \frac{2}{3}Q_s$$

$$Q_s = 15$$

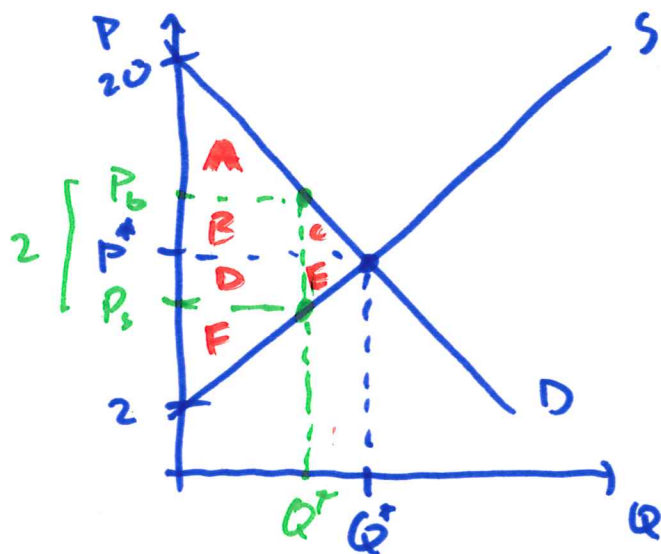
$$CS = A + B + C + D + F + G + H$$

$$PS = B + D + H$$

$$CS = A + B + C + D + F + G + H$$

$$PS = H$$

Q2. Butter beer Tax



PRE-TAX: $P_s = P_d$

$$20 - \frac{1}{2}Q = 2 + \frac{1}{2}Q$$

$$18 = Q^*$$

$$P = 2 + \frac{1}{2} \cdot 18$$

$$P^* = 11$$

POST-TAX: $P_d = P_s + 2$

$$2 + \frac{1}{2}Q + 2 = 20 - \frac{1}{2}Q$$

$$4 + Q = 20$$

$$Q^* = 16$$

$$CS = A + B + C$$

$$PS = D + E + F$$

$$CS = A$$

$$PS = F$$

$$GOV = B + D$$

$$DWL = C + E$$

$$P_s = 2 + \frac{1}{2} \cdot 16$$

$$P_s = 10$$

$$P_b = 12$$

$$CS = \frac{1}{2} \cdot (20 - 12) \cdot 16$$

$$= 8 \cdot 8$$

$$= 64$$

$$Gov = 2 \cdot 16$$

$$= 32$$

$$PS = \frac{1}{2} \cdot (10 - 2) \cdot 16$$

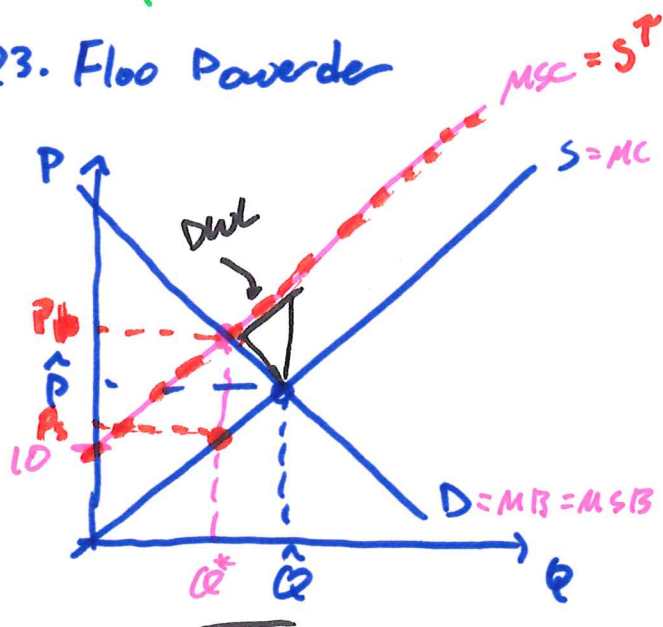
$$= 8 \cdot 8$$

$$= 64$$

$$DWL = \frac{1}{2} \cdot 2 \cdot 2 = 2$$

The tax lowered quantity, raised the buyer's price by 1, lowered the seller's price by 1, generated government rev, and produced DWL.

Q3. Floor Power



MARKET

$$100 - 2Q = Q$$

$$100 = 3Q$$

$$\hat{Q} = \frac{100}{3}$$

$$\hat{P} = \frac{100}{3}$$

$$DWL = \frac{1}{2} \cdot 10 \cdot \left(\frac{100}{3} - 30 \right) =$$

$$= 5 \cdot \frac{10}{3} =$$

$$= \frac{50}{3}$$

SOCIAL

$$MSB = MSC$$

$$100 - 2Q = 10 + Q$$

$$90 = 3Q$$

$$Q^* = 30$$

Impose a tax equal to the value of the externality.

$$T = 10$$

$$P_b = 100 - 2 \cdot 30$$

$$P_b = 40$$

$$P_s = 30$$