

Problem Set 2—Solutions

Note: Answers were rounded to the nearest hundredth after solving for a fractional amount of change in price and quantity.

Big Beer dresses up in craft brewers' clothing

1. Craft beer elasticities:

(a) $\frac{\% \Delta Q}{\% \Delta P} \approx -0.07$ ($P = 5; Q = 18.75$)

A 1% change in the price of craft beer leads to a 0.07% decrease in the quantity demanded of craft beer. Craft beer is relatively inelastic.

(b) $\frac{\% \Delta Q}{\% \Delta P} \approx -0.13$ ($P = 5; Q = 8$)

A 1% change in the price of craft beer leads to a 0.13% decrease in the quantity demanded of craft beer. Craft beer is relatively inelastic.

2. Macrobrew flexibilities:

(a) $\frac{\% \Delta P}{\% \Delta Q} \approx -0.33$ ($P = 15; Q = 5$)

A 1% change in the quantity of macrobeer leads to a 0.33% decrease in the price demanded of macrobeer. Macrobeer is relatively inflexible.

(b) $\frac{\% \Delta P}{\% \Delta Q} = -1.00$ ($P = 50; Q = 5$)

A 1% change in the quantity of macrobeer leads to a 1% decrease in the price demanded of macrobeer. Macrobeer is unit flexible.

3. Multi-factor supply functions:

(a) At the calculated $Q = 400$:

i. $\frac{\% \Delta Q_{beer}}{\% \Delta P_{beer}} = 0.05$

A 1% change in the price of beer leads to a 0.05% increase in the quantity supplied of beer.

ii. $\frac{\% \Delta Q_{beer}}{\% \Delta P_{hops}} = -0.25$

A 1% change in the price of hops (an input) leads to a 0.25% decrease in the quantity supplied of beer.

iii. $\frac{\% \Delta Q_{beer}}{\% \Delta P_{barley}} = -0.05$

A 1% change in the price of barley (an input) leads to a 0.05% decrease in the quantity supplied of beer.

(b) The supply function is: $Q_{barley} = -40 + 4P_{barley} + 8P_{wheat}$ and the quantity is $Q = 56$:

- i. $\frac{\% \Delta Q_{\text{barley}}}{\% \Delta P_{\text{barley}}} \approx 0.71$
A 1% change in the price of barley leads to a 0.71% increase in the quantity supplied of barley.
- ii. $\frac{\% \Delta Q_{\text{barley}}}{\% \Delta P_{\text{wheat}}} = 1$
A 1% change in the price of wheat leads to a 1% change in the quantity supplied of barley.

4. Demand for craft beer:

- (a) $Q_{\text{beer}} = 2530$
- (b) $\frac{\% \Delta Q_{\text{beer}}}{\% \Delta P_{\text{beer}}} \approx -0.01$
- (c) Cross-elasticities:
 - i. $\frac{\% \Delta Q_{\text{beer}}}{\% \Delta P_{\text{wine}}} \approx 0.02$
 - ii. $\frac{\% \Delta Q_{\text{beer}}}{\% \Delta Q_{\text{macro beer}}} \approx -0.99$
 - iii. $\frac{\% \Delta Q_{\text{beer}}}{\% \Delta Q_{\text{farmers markets}}} \approx 0.40$
- (d) More responsive to macro beer quantities because it appears that this is a more direct effect.

5. Equilibrium displacement models

- (a) The calculated $Q_{\text{barley}} = 300$. The associated demand and supply elasticities are:

$$\frac{\% \Delta Q_{\text{barley}}^D}{\% \Delta P_{\text{barley}}} \approx -0.17$$

$$\frac{\% \Delta Q_{\text{barley}}^D}{\% \Delta P_{\text{craft beer}}} \approx 0.47$$

$$\frac{\% \Delta Q_{\text{barley}}^D}{\% \Delta P_{\text{macro beer}}} \approx 0.23$$

$$\frac{\% \Delta Q_{\text{barley}}^S}{\% \Delta P_{\text{barley}}} \approx 0.33$$

$$\frac{\% \Delta Q_{\text{barley}}^S}{\% \Delta P_{\text{wheat}}} \approx -0.12$$

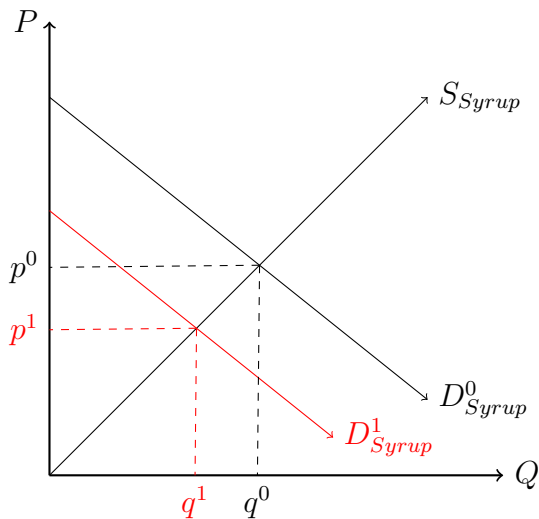
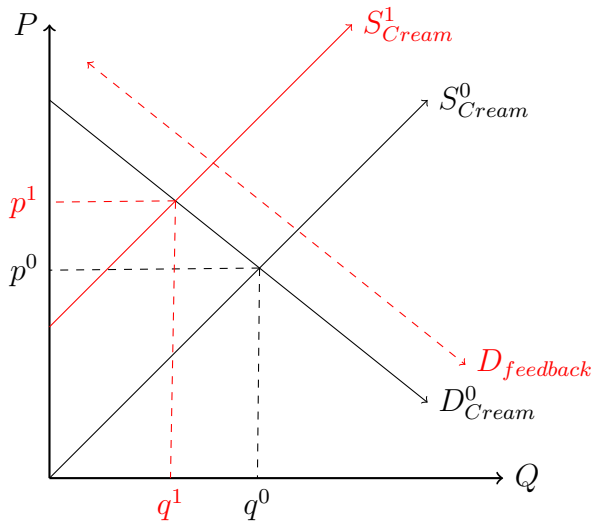
$$\frac{\% \Delta Q_{\text{barley}}^S}{\% \Delta P_f} = -0.25$$

Wheat is a substitute in production, because it is another small grain that can be grown on similar land on which barley is grown.

- (b) A 5% shock to barley demand will result in a $\% \Delta P_{\text{barley}} = 10\%$ and a $\% \Delta Q_{\text{barley}} \approx 3.33\%$.
- (c) A 2.5% shock to barley demand will result in a $\% \Delta P_{\text{barley}} = 5\%$ and a $\% \Delta Q_{\text{barley}} \approx 1.67\%$.

6. Cream and corn syrup

- (a) Cream and corn syrup have complementary effects on each other's markets.
- (b) A decrease in supply of cream will lead to a decrease in demand for corn syrup due to complementarity. A resulting decrease in the price of corn syrup will cause a feedback increase in demand for cream as syrup becomes less expensive relative to cream in production of ice cream. The price of cream will increase. In turn, this will cause an increase in the demand for syrup and raise its price to p^2 . The higher price of syrup will lead to another feedback effect in the cream market, shifting the demand slightly back to p^2 in the cream market.



7. Cross elasticities

(a) $\frac{\% \Delta Q_{IC}^D}{\% \Delta P_{Froyo}} = 0.7$

A 1% increase in the price of frozen yogurt will result in a 0.7% increase in quantity of ice cream demanded. The positive cross price elasticity indicates that ice cream and Froyo are substitutes.

(b) $\frac{\% \Delta Q_{IC}^S}{\% \Delta P_{Milk}} = -1.2$

A 1% increase in the price of milk will result in a 1.2% decrease in quantity of ice cream supplied. Ice cream supply has negative cross price elasticity with milk because milk is an input in the production of ice cream.

8. Market shocks

- $\% \Delta P_{IC} \approx 0.33\%$
- $\% \Delta Q_{IC} \approx 2.33\%$

9. Market shocks in complementary markets.

- $\% \Delta P_{IC} \approx 0.37\%$
- $\% \Delta Q_{IC} \approx 2.37\%$
- $\% \Delta P_{Froyo} \approx 0.17\%$
- $\% \Delta Q_{Froyo} \approx 0.60\%$