

# Econ 102 Discussion – Week 5

February 20 – 21, 2014

## International Trade

1. Domestic demand for coffee (in pounds) is given by the equation:  $P = 13 - Q^D$   
Domestic supply of coffee (in pounds) is given by the equation:  $P = 3Q^S + 1$   
The world price of 1 pound of coffee is \$4.  
a) Assume that this economy is closed to trade. What is the equilibrium price and quantity?

$$13 - Q^D = 3Q^S + 1 \text{ and } Q^D = Q^S \Rightarrow 12 = 4Q \Rightarrow Q = 3$$
$$P = 13 - 3 \Rightarrow P = 10$$

- b) Now assume that this economy is open to world trade. How many pounds of coffee will they import or export?

$$4 = 13 - Q^D \Rightarrow Q^D = 9$$
$$4 = 3Q^S + 1 \Rightarrow Q^S = 1$$
$$IM = Q^D - Q^S = 9 - 1 = 8$$

- c) Suppose that the government implements an import quota of 4 pounds cocoa beans. Calculate the new equilibrium price and quantity, as well as consumer surplus, producer surplus, and license holder revenue from the quota. What is the deadweight loss?

$$Q^D = Q^S + \text{quota} \Rightarrow Q^D = Q^S + 4$$
$$P = 13 - (Q^S + 4) \Rightarrow P = 9 - Q^S$$
$$P = 3Q^S + 1 = 9 - Q^S \Rightarrow 4Q^S = 8 \Rightarrow Q^S = 2 \text{ and } Q^D = 6$$

## GDP Measurement

2. The small economy of Pizzania produces three goods (bread, cheese, and pizza), each produced by a separate company. The bread and cheese companies do not buy inputs. The pizza company uses only bread and cheese from the other companies to produce pizza. All three companies use capital and labor to produce output, and the difference between the value of the goods sold and total costs is firm profit.

	Bread Company	Cheese Company	Pizza Company
Wages	\$15	\$20	\$75

Interest	\$20	\$10	\$20
Value of Output	\$50	\$35	\$200

a) Calculate GDP using the definition.

Value of output =  $P \cdot Q = \$200$ . Therefore,  $GDP = \$200$ .

b) Calculate GDP using the expenditure method.

$$GDP = C + I + G + (X - M)$$

$$C = \$200$$

$$I = G = X = M = \$0$$

$$\text{Therefore, } GDP = \$200.$$

c) Calculate GDP using the income method.

$$GDP = \text{wages} + \text{interest} + \text{rent} + \text{profits}$$

$$\text{Wages} = \$15 + \$20 + \$75 = \$110$$

$$\text{Interest} = \$20 + \$10 + \$20 = \$50$$

$$\text{Rent} = \$0$$

$$\text{Value of output} = \$50 + \$35 + \$200 = \$285$$

$$\text{Cost} = (\$15 + \$20 + \$0) + (\$20 + \$10 + \$0) + (\$75 + \$20 + \$50 + \$35) = \$35 + \$30 + \$180 = \$245$$

$$\text{Profit} = \$285 - \$245 = \$40$$

$$\text{Therefore, } GDP = \$110 + \$50 + \$40 = \$200.$$

d) Calculate GDP using the value-added method.

$$\text{Value-added}^{\text{BREAD}} = \$50 - \$0 = \$50$$

$$\text{Value-added}^{\text{CHEESE}} = \$35 - \$0 = \$35$$

$$\text{Value-added}^{\text{PIZZA}} = \$200 - (\$50 + \$35) = \$115$$

$$GDP = \text{Value-added}^{\text{BREAD}} + \text{Value-added}^{\text{CHEESE}} + \text{Value-added}^{\text{PIZZA}} = \$50 + \$35 + \$115 = \$200$$

3. Now suppose that the bread and cheese companies sell their products both as inputs for pizza and directly to consumers. Input costs are unchanged from problem 2.

	Bread Company	Cheese Company	Pizza Company
Wages	\$35	\$30	\$75
Interest	\$40	\$20	\$20

Value of Output	\$100	\$60	\$200
-----------------	-------	------	-------

Repeat the calculations from problem 2. Do your answers in problems 2 and 3 differ? Explain.

(a) **Definition:**

$$\text{Value of final output} = (\$100 - \$50) + (\$60 - \$35) + \$200 = \$50 + \$25 + \$200 = \$275$$

(b) **Expenditure:**

$$\begin{aligned} \text{GDP} &= C + I + G + (X - M) \\ C &= (\$100 - \$50) + (\$60 - \$35) + \$200 = \$275 \\ I &= G = X = M = \$0 \\ \text{Therefore, GDP} &= \$275. \end{aligned}$$

(c) **Income:**

$$\begin{aligned} \text{GDP} &= \text{wages} + \text{interest} + \text{rent} + \text{profits} \\ \text{Wages} &= \$35 + \$30 + \$75 = \$140 \\ \text{Interest} &= \$40 + \$20 + \$20 = \$80 \\ \text{Rent} &= \$0 \end{aligned}$$

$$\begin{aligned} \text{Value of output} &= \$100 + \$60 + \$200 = \$360 \\ \text{Cost} &= (\$35 + \$40 + \$0) + (\$30 + \$20 + \$0) + (\$75 + \$20 + \$50 + \$35) = \$75 + \$50 + \$180 = \$305 \\ \text{Profit} &= \$360 - \$305 = \$55 \end{aligned}$$

$$\text{Therefore, GDP} = \$140 + \$80 + \$55 = \$275.$$

$$\begin{aligned} \text{(d) Value-added}^{\text{BREAD}} &= \$100 - \$0 = \$100 \\ \text{Value-added}^{\text{CHEESE}} &= \$60 - \$0 = \$60 \\ \text{Value-added}^{\text{PIZZA}} &= \$200 - (\$50 + \$35) = \$115 \end{aligned}$$

$$\text{GDP} = \text{Value-added}^{\text{BREAD}} + \text{Value-added}^{\text{CHEESE}} + \text{Value-added}^{\text{PIZZA}} = \$100 + \$60 + \$115 = \$275$$

The GDP differs from problem 2 because bread and cheese have become more productive.