Economics 101
Spring 2018
Homework #2
Due Thursday, February 22, 2018

Directions:

- The homework will be collected in a box **before** the lecture.
- Please place **your name, TA name, and section number** on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade.
- Late homework will **not** be accepted so make plans ahead of time.
- **Show your work**. Good luck!

Please realize that you are essentially creating "your brand" when you submit this homework. Do you want your homework to convey that you are competent, careful, and professional? Or, do you want to convey the image that you are careless, sloppy, and less than professional? For the rest of your life you will be creating your brand: please think about what you are saying about yourself when you submit any work for someone else.

Part I: PPF, Opportunity Cost, Trading prices, Comparative and Absolute Advantage

Consider two countries A and B. Assume all people living in those countries are employed. There are 100 people living in A and 300 in B. There are only two products that both countries produce: candy and ice-cream. Given the same time period, country A can produce 1000 pounds of candies or 800 pounds of ice-cream or any other combination of the two goods that lies on the line containing these two production points while country B can produce 2000 pounds of candies or 2400 pounds of ice-cream or any other combination of the two goods that lies on the line containing these two production points.

a) Graph the production possibilities frontiers of both countries with ice-cream on the horizontal axis and candy on vertical axis. Write the equations of both PPF's.

b) Identify which country has an absolute and comparative advantage in both goods. Calculate the opportunity cost of producing each good taking into consideration the number of workers each country has.

c) Graph and write down the equation for the joint PPF of both countries. Remember to find the kink point and that the function is defined differently on different parts of the production possibility frontier.

d) What is the range of acceptable trading prices for one unit of ice-cream and one unit of candy between the two countries? Explain your answer.

e) After a strong earthquake in country B, 200 people decided to move from country B to country A. They all immediately found jobs and started working. Since more people are now working in country A, production of both goods increased there. Suppose now that given the same time

period, country A can produce 1200 pounds of candies or 1200 pounds of ice-cream while country B can still produce 2000 pounds of candies or 2400 pounds of ice-cream. Graph new PPFs for both countries and derive the equations.

f) Which country now has absolute advantage in production of both goods? Which country has comparative advantage in ice-cream production and in candy production? Remember to take into account movement of people from country B to country A.

g) Assume that now the third country C decided to start producing the same two goods. Given the same time period as before, country C can produce either 800 pounds of ice-cream or 1600 pounds of candies or any combination of the two goods that lies on the line containing these two production points. Does this change which country has the comparative advantage in producing ice-cream or candy now? Which country should specialize in producing candy? Which country should specialize in producing ice-cream? Plot the joint PPF for countries A, B and C. Remember that you have to identify the kink points based on specialization of each country.

Part II: Demand and Supply Shifts

Suppose there are only two laptop producers: Dell and Lenovo. Fundamental assumptions of supply and demand are that quantity demanded decreases when price increases while quantity supplied increases when price increases. Therefore, the demand curve has a negative slope and the supply curve has a positive slope. Let the Dell and Lenovo laptops be perfect substitutes for each other, meaning that whenever the price of a Dell laptop increases the demand for laptops made by Lenovo increases and vice-versa. Assume that both types of computers are normal goods.

Initially markets for both types of laptops are in equilibrium. In each of the following questions describe the change to the demand and the supply (this could be a demand shift, a supply shift, a change in the quantity demanded, and/or a change in the quantity supplied) for both types of laptops and explain how the equilibrium prices and quantities change compared to the initial equilibrium prices and quantities for these two types of laptops.
Assume that before every change in the scenario the market price and quantity in both markets returns to equilibrium.

a) One of the Lenovo's factories that makes 40% of their laptops was damaged by an earthquake and has to be closed for 6 months to repair the damage. As a consequence of this earthquake, many people lost their jobs in the Lenovo factory.

b) News spread out that Dell used cheap chips inside of their laptops and those chips are dangerous for people's health. Consequently, consumers are now more willing to buy Lenovo laptops.

c) Dell has to change one of their input suppliers to a more expensive one because of a disagreement with their initial supplier of inputs. This change in input suppliers raises the cost of producing a Dell laptop.

d) For this question, consider only the market for Lenovo laptops. A new study ordered by the government finds that the adverse effect from laptop radiation is not nearly as harmful as from other electronic devices, so people are now willing to buy more laptops. The government wishing to cover the cost of the study has assessed a new tax on laptop producers that will cover the cost of the study.

e) Assume that Dell laptops are an inferior good and that Lenovo laptops are a normal good. Also, do not forget that consumers are indifferent between buying any of the two laptops, i.e. the two different brands of laptops are perfect substitutes for one another. Suppose the production costs for Lenovo as well as Dell laptops have increased. At the same time the wealth of all consumers in these markets have increased. How will the equilibrium in both markets change?

Part III: Price Ceiling and Price Floor

One of the common examples of a price ceiling policy is the setting of maximum rent in big cities such as New York and San Francisco. Now consider the market for rental apartments in Madison and assume that all the apartments are the identical. Use graphs to help visualize the following changes.
Demand and Supply equations for the market are as follows:

Demand for apartments in Madison: $Q_d = 450 - (1/2)P$

Supply of apartments in Madison: $P = Q_s + 210$

a) What is the equilibrium price and quantity in the market for apartment rentals?

b) What is the value of consumer surplus and producer surplus in the market for apartment rentals in Madison? Draw a graph illustrating your answer and then provide a numerical calculation for these two values.

c) Suppose the government decides to enact a price ceiling in the market for apartments in Madison. The price ceiling is set at $500. Given this price ceiling what is the quantity of apartments demanded in this market and what is the quantity of apartments supplied in this market? Is there a shortage or a surplus in the market once the price ceiling is implemented? Calculate the deadweight loss, consumer, producer and total surplus given this policy relative to no government intervention in this market.

d) Suppose the government implements a price ceiling of $400 in the market for apartments in Madison. Given this price ceiling what is the quantity of apartments demanded in this market and what is the quantity of apartments supplied in this market? Is there a shortage or a surplus in the market once the price ceiling is implemented? Calculate the consumer surplus and producer and total surplus given this policy relative to no government intervention in this market.

e) Fill in the table below that compares the price ceiling of $400 and initial equilibrium price and quantity in the market that was calculated in (a) and (b).

	Before price ceiling	After price ceiling	Change
Consumer Surplus			
Producer Surplus			
Deadweight Loss			

Total Surplus			

f) One famous economist claimed that implementing a price floor instead of a price ceiling increases social welfare. Suppose the government decides to conduct a field experiment to evaluate this claim. Instead of implementing a price ceiling, the government decides to set a price floor of $500 per apartment. Given this price floor what is the quantity of apartments demanded in this market and what is the quantity of apartments supplied in this market? Is there a shortage or a surplus in the market once the price floor is implemented? Calculate the deadweight loss, consumer, producer and total surplus given this policy. Fill in the table below that compares the price floor of $500 per apartment and the initial equilibrium price and quantity in the market that was calculated in (a) and (b).

	Before price floor	After price floor	Change
Consumer Surplus			
Producer Surplus			
Deadweight Loss			
Total Surplus			

Part IV: Agricultural Markets: Price Support and Price Guarantee Systems

Suppose the U.S. Department of Agriculture proposes a plan to support farmers who produce milk. Under this program, the government will buy any excess quantity of milk at a price that will be determined.
Demand and Supply for milk are defined by following equations where P is the price per gallon and Q is the number of gallons:

Demand: $P = 32 - 4Q_d$

Supply: $P = 2Q_s + 2$

a) What are the price and quantity of milk in a competitive equilibrium, before any government intervention? Plot the supply and demand curves and the point of equilibrium in a graph.

b) The government decides to buy any excess supply from farmers at a price of $14 per gallon of milk. Given the implementation of this program, what quantity of milk will be purchased by consumers? What quantity of milk will be purchased by the government? Given this program, how much do consumers spend on milk? What is the cost to the government of this program? What is the total revenue to the farmers from this program?

c) To be able to compare all available policies, the government decides to cancel the previous program and instead initiates a price guarantee program. Under this program the government will ensure that consumers can purchase the total quantity of milk in the economy that farmers are willing to produce at a price of $14 per gallon by subsidizing the producers of milk so that they receive $14 per gallon of milk after receipt of the subsidy. This is the amount that you computed in part (b). The implementation of this policy turned out to be costly for the government and it had to hire a specialist and promise to pay the specialist 30% of the total subsidy the government paid the farmers.

Given this program, what quantity of milk would be purchased by consumers? What is the price per gallon of milk to consumers with this price subsidy program? What is the price per gallon of milk for farmers given this price subsidy program? Given this program, what is the consumer expenditure on milk? What is the cost to the government of this subsidy program? What is the total revenue to the farmers given this subsidy program?

d) Compare the two programs. Which program would consumers prefer? Which program would producers prefer? Which program would the government prefer? Why?

e) Besides the cost of the programs to the government, what other considerations could impact the government's choice between the price support and the price guarantee program? Explain your answer fully and completely.

Part V: Demand and Supply: numerical example

Consider the market for coffee in Madison. Assume quantity (Q) is measured in cups of coffee and price (P) is measured in dollars per cup. The supply and demand in the market are given by following equations:

Demand: $Q_d = 3500 - 500P$

Supply: $Q_s = 1000P - 1000$

a) Calculate equilibrium price and quantity in the market for coffee. Calculate consumer, producer and total surplus in equilibrium. What is the deadweight loss in equilibrium?

b) During the final exam period, consumption of coffee among students increases dramatically. Assume that the demand increases by 1500 cups of coffee at each price level during the final exam period. Find the new equation for the demand for coffee. Note that supply is not changing.

c) Find new equilibrium price and quantity in the coffee market. Calculate consumer, producer and total surplus.

d) Assume that during exam period coffee producers decided to increase the price of a cup of coffee to $6 per cup of coffee. Find the quantity demanded and supplied at this new price taking into consideration the new demand curve equation which you derived in (c). Is there a shortage or surplus in the market for coffee now? What if coffee suppliers decreased the price to $2 per cup, would there be a surplus or shortage in the coffee market?

Part VI: Excise tax

Consider the market for cheese curds in Madison. Assume the quantity (Q) is measured in pounds of cheese curds and the price (P) is measured in dollars per pound. Demand and supply in the market are given by following equations:

Demand: $Q_d = 300 - 50P$

Supply: $Q_s = 50P - 100$

a) Draw a graph of the supply and demand curves in this market. Pay special attention to the y-intercept of the supply curve. Find the equilibrium price and quantity in the market and calculate consumer, producer and total surplus.

Now suppose that the government decides to impose an excise tax of $1 per pound of cheese curds in order to control or limit the consumption of cheese curds.

b) Find the new equation for the supply of cheese curds with the imposition of this excise tax. What happens to the equilibrium quantity and price of cheese curds after the imposition of an excise tax? Calculate the value of consumer surplus, producer and total surplus in this market once this excise tax is implemented. How much tax revenue is generated when this excise tax is implemented? What is the amount of deadweight loss due to the excise tax?

Part VII: Production Possibility Frontier with 3 individuals.

Suppose individuals A, B and C are on a stranded island. There are no other people on the island except for A, B and C. Each of them can only do two activities to survive: either gather coconuts or catch fish. Individual A can either gather 10 coconuts or catch 16 fish; individual B can either gather 8 coconuts or catch 10 fish and individual C can either gather 20 coconuts or catch 20 fish. Assume that all three of these individuals have linear production possibility frontiers.

a) Who has the absolute advantage in catching fish and who has the absolute advantage in gathering coconuts? Consider the maximum productivity of each individual when deciding on who has the absolute advantage.

b) Who has the comparative advantage in catching fish and who has the comparative advantage in gathering coconuts? Consider the opportunity costs each individual has in each of the tasks when determining the comparative advantage.

c) Plot each individual's PPF. Put the quantity of fish on x-axis and quantity of coconuts on the y-axis.

d) Plot the joint PPF of all three individuals. Remember to take into account the kink points.