Introduction to Economics: Problem Set 1

Due on January 26th, 2024 at 11:59pm
Tuesday/Thursday 3:30-4:45, Genome Sciences 100

Robert McDonough - ECON 101

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Question 1

We apply the cost-benefit principle every day. As students, the choice to attend UNC involved big costs and (hopefully) benefits.

(a) Attending UNC involves large out-of-pocket costs, which are listed on UNC's student aid website: `https://studentaid.unc.edu/current/costs/`. Using this site, find the total yearly cost of attending UNC as an in-state student.

$$\$27,036$$

(b) What is the North Carolina state minimum wage? Use the state minimum wage to calculate the foregone wages that you lose by attending UNC for the year.

$$\begin{aligned}\text{NC minimum wage } &= \$7.25\\ \text{Foregone wages } &= \$7.25 \times 16\frac{weeks}{semester} \times \text{ 2 semesters } \times \text{ 40 } \frac{hours}{week} = \$9,280\end{aligned}$$

(c) Not all costs are measured in dollars! Describe some of the nonmonetary costs of spending a year at UNC.

- Time spent studying
- Stress and mental health impacts
- Social sacrifice (not being able to see friends and family)
- Physical health impacts (sleep, exercise, etc.)
- Delayed entry into the workforce

(d) At UNC, most students graduate after 8 semesters (4 years). Setting aside the non-monetary costs, use the numbers you found above to calculate the opportunity cost of earning your degree. Ignore the possibility of student loans and aid, and pretend that you are paying out of pocket.

$$\begin{aligned}\text{Opportunity cost } &= \$27,036 \times \text{ 4 years } + \$9,280 \times \text{ 4 years}\\ &= \$145,248\end{aligned}$$

(e) Explain the cost-benefit principle in a sentence or two. Incorporating the numbers you found above, then explain your decision to attend UNC this year using the cost-benefit principle.

The cost-benefit principle states that an individual should take an action if and only if the benefit of taking that action is greater than the cost of taking that action.

For me, the average starting salary for a computer science major is $80,000. After working for two years leaving college my benefit would outweigh the cost of attending UNC. I also enjoy the social aspect of college and the opportunity to learn new things.

Question 2

Your car needs gas before you can go to work this morning. You decide to go to the gas station that is out of the way, but where gas is \$0.10/gallon cheaper than the gas station on the way to work. This gets you into work 10 minutes later than going to the other gas station. If your wage is \$20/hour and you have to purchase 20 gallons of gas, was this worth it? Why or why not?

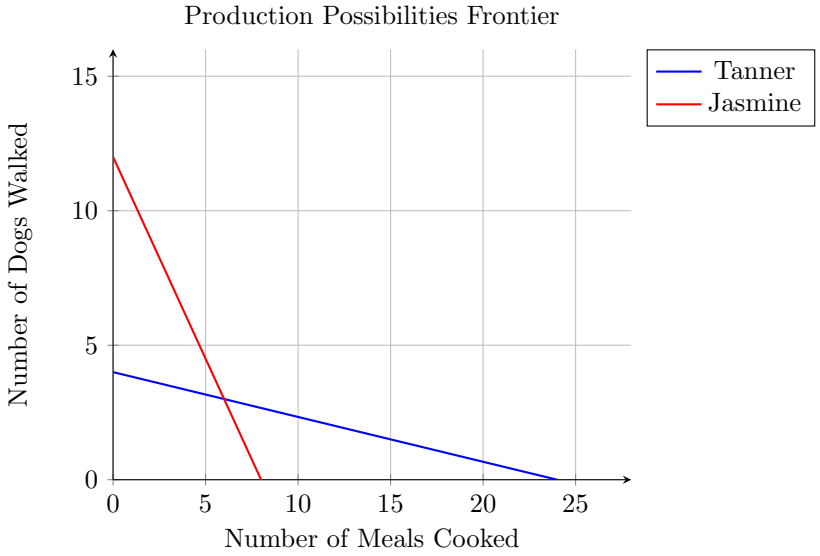
$$\begin{aligned}
\text{Money saved on gas} &= \$0.10 \times \text{ 20 gallons } = \$2.00 \\
\text{Cost of time} &= \$20.00 \times \frac{1}{6} \text{ hours } = \$3.33 \\
\text{Total benefit} &= \$2.00 - \$3.33 = -\$1.33
\end{aligned}$$

According to the cost-benefit principle, this was not worth it. The cost of time outweighs the money saved on gas.

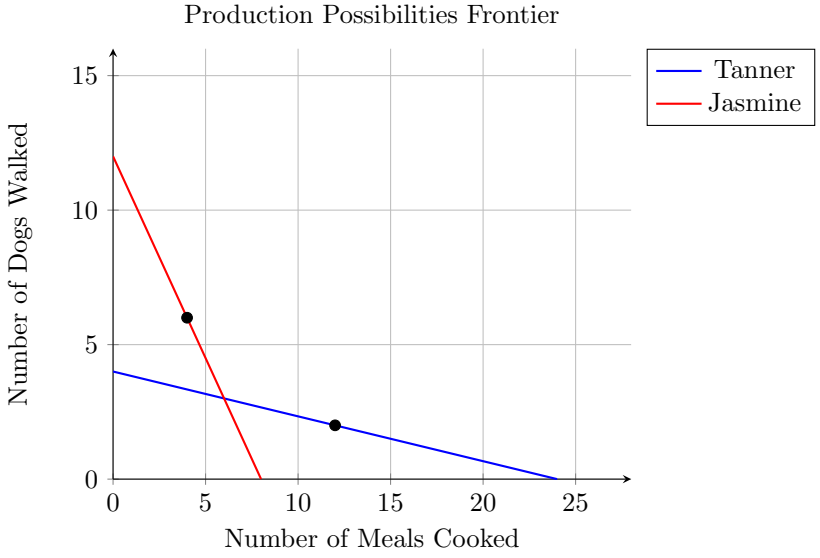
Question 3

Tanner and Jasmine are each capable of producing two services: walking dogs or cooking meals. Tanner can cook a meal for 6 people in an hour, or walk 1 dog in an hour. Jasmine can cook a meal for 2 person in an hour, or walk 3 dogs in an hour. They each have 4 hours available to use to cook meals or walk dogs.

(a) Draw a production possibilities frontier showing Tanner's capacity to cook meals or walk dogs, then add another PPF showing Jasmine's ability to cook meals or walk dogs.



(b) Label (including numbers) a point on Tanner's PPF that he could produce at without trading. Do the same for a point on Jasmine's PPF



Tanner could produce 12 meals and walk 2 dogs without trading. Jasmine could produce 4 meals and walk 6 dogs without trading. This would be a total of 16 meals cooked and 8 dogs walked.

(c) Who has the comparative advantage in cooking meals? Who has the comparative advantage in walking dogs? Explain both answers.

Opportunity Cost	Meals Cooked	Dogs Walked
Tanner	$\frac{1}{6}$ dog	6 meals
Jasmine	$\frac{3}{2}$ dog	$\frac{2}{3}$ meal

Tanner has the comparative advantage in cooking meals because he can cook 6 meals in an hour while Jasmine can only cook 2 meals in an hour. Jasmine has the comparative advantage in walking dogs because she can walk 3 dogs in an hour while Tanner can only walk 1 dog in an hour.

(d) Tanner and Jasmine decide to specialize in producing one thing, then trade. What will Tanner choose to produce and what will Jasmine choose to produce. Explain your answer.

Tanner will choose to produce meals because he has the comparative advantage in cooking meals. Jasmine will choose to produce walking dogs because she has the comparative advantage in walking dogs.

(e) What can we say about the price that Tanner and Jasmine would both be willing pay to trade meals and dog walks?

Meals per dog walks:
Tanner would be willing to trade a meal for anything more than $\frac{1}{6}$ of a dog walk, while Jasmine would be willing to trade a meal for anything less than $\frac{3}{2}$ of a dog walk.

Dog walks per meal:
Tanner would be willing to trade a dog walk for anything less than 6 meals, while Jasmine would be willing to trade a dog walk for anything more than $\frac{2}{3}$ of a meal.

(f) Suppose that before trading, Tanner and Jasmine each spent two hours walking dogs and two hours cooking meals. What are the gains to specialization and trade in this situation? Provide an example for how the gains from trade could be distributed so that Tanner and Jasmine each have more of each service than before.

Before Trading

	Meals Cooked	Dogs Walked
Tanner	12	2
Jasmine	4	6

Now, if both of them specialized, Tanner would cook 24 meals and Jasmine would walk 12 dogs. Let's say that Tanner and Jasmine agree to trade 2 meals for 1 dog walk, and they trade 12 meals for 6 dog walks.

After Trading

	Meals Cooked	Dogs Walked
Tanner	12	6
Jasmine	12	6

After trading, Tanner and Jasmine each have more than before trading, so there are gains to specialization and trade.

(g) In your example for how the gains of trade could be distributed, how much of each good are Tanner and Jasmine trading to one another? Do these "terms of trade" make sense, given what you wrote in part (e)?

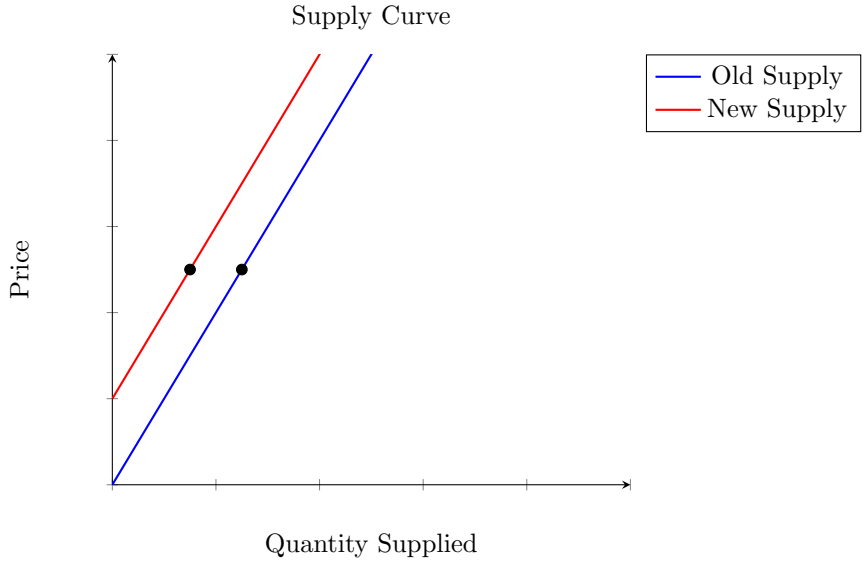
Tanner and Jasmine are trading 2 meals for 1 dog walk. These terms of trade make sense because Tanner would be willing to trade a meal for anything more than $\frac{1}{6}$ of a dog walk, while Jasmine would be willing to trade a meal for anything less than $\frac{3}{2}$ of a dog walk. Tanner would be willing to trade a dog walk for anything less than 6 meals, while Jasmine would be willing to trade a dog walk for anything more than $\frac{2}{3}$ of a meal. Therefore, Tanner and Jasmine would both be willing to trade 2 meals for 1 dog walk.

Question 4

Consider the market for a new physical copy of our textbook, *Principles of Economics by Stevenson and Wolfers*. The instructors teaching large classes of ECON 101 at UNC all use this textbook. For each of the following situations, decide if demand will shift, if supply will shift, or if neither will shift. Then, draw a graph clearly illustrating how supply or demand will shift.

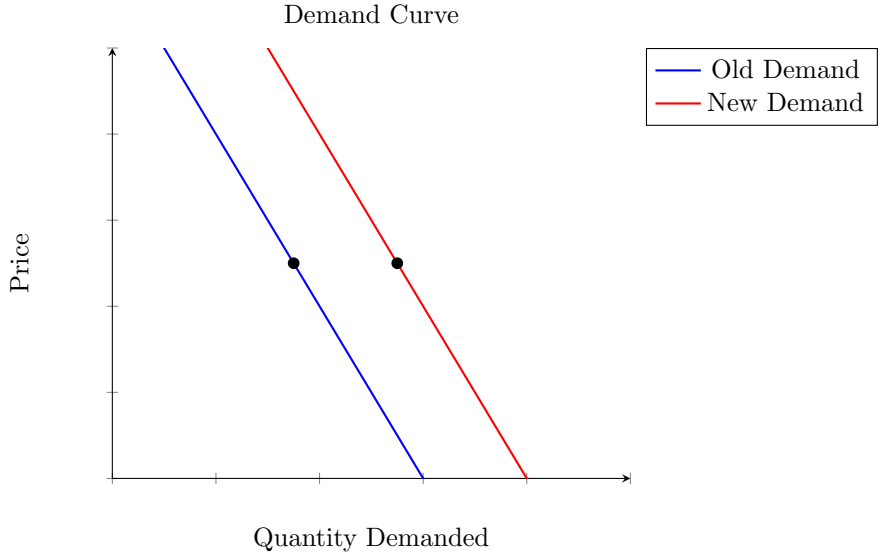
(a) The price of textbook ink increases.

Since this situation affects production cost, the supply curve will shift to the left (decrease).



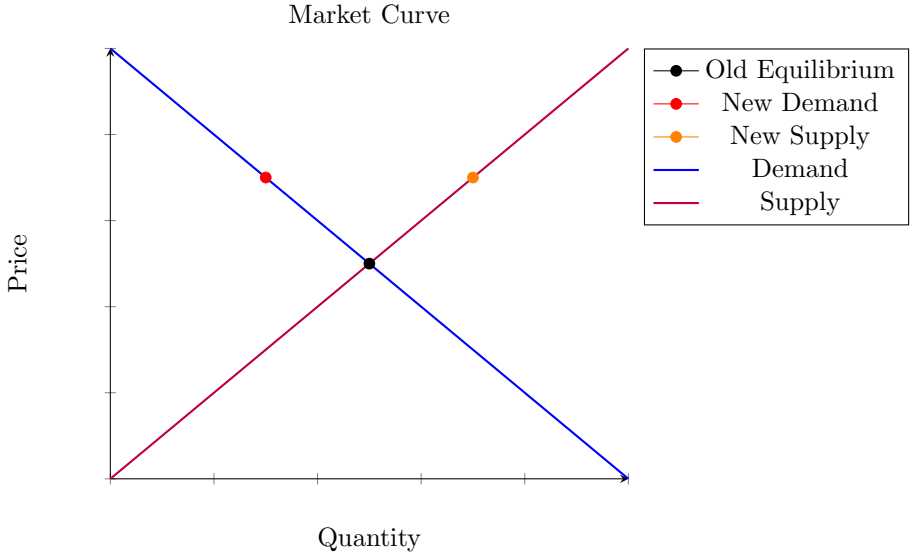
(b) UNC mandates that all arts and science majors must take ECON 101.

Since this situation affects the number of buyers, the demand curve will shift to the right (increase).



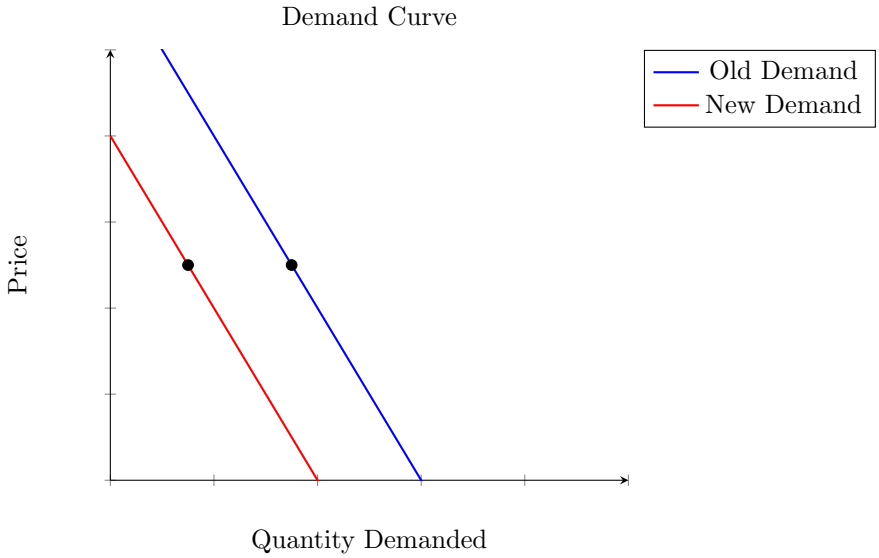
(c) The price of the textbook rises.

Since this situation affects the price of the good, there won't be a shift in either demand or supply curves, but a movement up the demand curve (decrease in quantity demanded) and a movement up the supply curve (decrease in quantity supplied).



(d) The price of used copies of the old edition of the textbook decrease.

Since this situation affects the price of a substitute good, the demand curve will shift to the left (decrease).



Question 5

Consider the daily market for a cup of coffee in Chapel Hill. Market demand for coffee is given by the equation $P = 80 - \frac{1}{2}Q_d$, and market supply of coffee is given by $P = \frac{Q_s}{38}$.

(a) If the price of coffee is \$0, how many cups would buyers want to consume? How many cups would sellers want to sell?

$$\begin{aligned} \text{If } P &= \$0 \\ 0 &= 80 - \frac{1}{2}Q_d \\ Q_d &= 160 \\ 0 &= \frac{Q_s}{38} \\ Q_s &= 0 \end{aligned}$$

It seems that buyers would want to consume 160 cups of coffee, but sellers would not want to sell any coffee.

(b) Calculate the price at which buyers would not want to buy any coffee (i.e., $Q_d = 0$).

$$\begin{aligned} P &= 80 - \frac{1}{2} \cdot 0 \\ P &= \$80 \end{aligned}$$

Buyers would not want to buy any coffee at \$80.

(c) Calculate the equilibrium price of coffee and the quantity of coffee cups sold in Chapel Hill every day.

$$\begin{aligned} Q_d &= 160 - 2P \\ Q_s &= 38P \\ 160 - 2P &= 38P \\ 160 &= 40P \\ P &= \$4 \end{aligned}$$

$$\begin{aligned} Q_d &= 160 - 2 \cdot 4 \\ Q_d &= 152 \end{aligned}$$

The equilibrium price of coffee is \$4 and there are 152 cups of coffee sold in Chapel Hill every day.

(d) Draw a properly labeled diagram for the market for coffee in Chapel Hill.