Economics 201 Fall 2020
Introduction to Economic Analysis Jeffrey Parker
Problem Set #1 Due: Wednesday, September 9

Instructions: This problem set is due at the beginning of class on Wednesday, September 9. Each student is to hand in his or her own independent solutions to the problem set. You may work together on the problem sets as long as "working together" means *learning together* or *learning from each other* and not simply sharing final answers.

If you get stuck, you are encouraged to ask questions of the instructor or the tutors. Tutors will be available at work sessions via Zoom according to the posted schedule. Individual tutoring (at no cost for up to one hour per week) can be arranged through the Office of Student Services.

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1. ***Analytics of a Linear Demand Curve.*** Suppose that the market demand for asparagus in Astonia is given by $Q_d = 25{,}000 - 2{,}000P$, where Q_d is the quantity demanded in pounds and P is the price of asparagus in dollars per pound.

(a) Graph the demand curve with price on the vertical axis and quantity on the horizontal axis.

(b) What is the slope of the demand curve? Is it constant? Explain the relationship between the slope and the coefficients of the demand equation?

(c) At what values does the demand curve intersect the vertical and horizontal axes? What economic interpretation can be attached to each of these points?

(d) According to the equation, what happens when the price is above the vertical intercept value or if quantity is greater than the horizontal intercept value? Is this realistic?

2. ***Analytics of a Logarithmic Demand Curve.*** Suppose that the market demand for peanut butter in Legumia is given by $\ln Q_d = 1.3863 - \ln P$, where ln is the natural (base e) logarithm function.

(a) Take the anti-logs of both sides of the demand equation to express Q_d directly as a function of P.

(b) Calculate the values of Q_d corresponding to prices of 0.10, 0.50, 1, 5, 10, and 100. Graph these points. What does the demand curve look like? Is it a straight line? (A scientific calculator or a spreadsheet program such as Excel or Google Sheets will be useful for this question. Be sure to use the LN or natural log function, not the base-10 log.)

(c) At what values, if any, does the demand curve intercept the vertical and horizontal axes? Is this more or less realistic than the linear demand curve in the previous problem?

3. ***Market Equilibrium, Price Supports, and Subsidies.*** The U.S. Department of Agriculture is interested in analyzing the domestic market for corn. The USDA's staff economists estimate the following linear equations for the demand and supply curves (in the neighborhood of equilibrium):

$$Q_d = 1{,}600 - 125P$$

$$Q_s = 440 + 165P$$

Quantities are measured in millions of bushels; prices are measured in dollars per bushel.

(a) Calculate the price and quantity that will prevail in competitive equilibrium. Graph the curves and show the equilibrium.

(b) Suppose that the government imposes a $4.50 per bushel support price (in other words, it does not allow sales at a price below $4.50) and commits to buying any surplus that might arise at that price.

(i) What impact will this price floor have on the market?

(ii) Will the government be forced to purchase corn in order to support the price floor? If so, how much and what will be the cost to the Treasury?

(iii) How much (if any) additional corn (relative to equilibrium) will be produced as a result of the price support? How much (if any) less corn will be consumed?

(c) Now suppose that a new corn hybrid is developed that increases yields so that the quantity supplied *increases by 145 million bushels* at each level of the corn price. What is the new equation for the supply curve? How will your answers to parts (a) and (b) be different after the new hybrid is introduced?

(d) Returning to the original values, suppose that instead of a price floor, the government pays corn growers $0.50 for each bushel produced.

(i) Explain why the supply curve with the subsidy would become $Q_s = 440 + 165(P + 0.50)$.

(ii) Calculate the new market equilibrium quantity and price.

(iii) Graph the new supply curve and show the new equilibrium.

(iv) How does the outcome under the subsidy compare to the outcome under the price support in terms of quantity bought by consumers, quantity produced by farmers, and cost to the government? Are there any other differences in the outcomes?