

Construction and Analysis of Market Demand and Supply Functions

Basic Reference: L. Tesfatsion, “Market Basics for Price-Setting Agents,” lecture notes linked to my syllabus (Section II) and available on-line at <http://www.econ.iastate.edu/classes/econ308/tesfatsion/mbasics.pdf>

This exercise focuses on the construction and analysis of individual and total “true” supply and demand functions based on seller and buyer reservation prices.

Consider an economy consisting of two sellers and three buyers. Each seller has an endowment of (identical) apples he is trying to sell, and each seller has a successively higher reservation price for each apple he sells. Each buyer would like to purchase apples, and each buyer has a successively lower reservation price for each apple he buys.

Table 1, below, presents the specific apple reservation prices for sellers (buyers) for each successive apple sold (bought). For example, according to Table 1, Seller 2 has three apples, total, that he is trying to sell. The minimum price that Seller 2 is willing to accept for his first apple sold is \$5.00. Assuming Seller 2 has sold one apple already, the minimum price Seller 2 is willing to accept for his second apple sold is \$25.00. Assuming Seller 2 has sold two apples already, the minimum price Seller 2 is willing to accept for his third apple sold is \$45.00. If Seller 2 succeeds in selling three apples, he then has no more apples to sell and his apple reservation price effectly becomes infinite.

Similarly, according to Table 1, Buyer 3 is interested in purchasing a maximum of two apples. The maximum price that Buyer 3 would be willing to pay for his first apple bought is \$45.00. Assuming Buyer 3 has already purchased one apple, the maximum price that Buyer 3 would be willing to pay for a second apple bought is \$40.00. If Buyer 3 succeeds in purchasing two apples, he then has no interest in purchasing any more apples and his apple reservation price falls to 0.

Part A: Using carefully labeled graphs with apple quantity on the horizontal axis and (unit) price of apples on the vertical axis, depict the TRUE SUPPLY FUNCTION FOR APPLES for EACH of the two sellers, Seller 1 and Seller 2.

Part B: Using Part A, carefully derive and graphically depict the TRUE TOTAL SUPPLY FUNCTION FOR APPLES for this economy with apple quantity on the horizontal axis and the (unit) price of apples on the vertical axis.

Part C: Using carefully labeled graphs with apple quantity on the horizontal axis and (unit) price of apples on the vertical axis, depict the TRUE DEMAND FUNCTION FOR APPLES for EACH of the three buyers, Buyer 1, Buyer 2, and Buyer 3.

Part D: Using Part C, carefully derive and graphically depict the TRUE TOTAL DEMAND FUNCTION FOR APPLES for this economy with apple quantity on the horizontal axis and (unit) price of apples on the vertical axis.

Part E: Using Parts B and D, use graphical analysis to determine a COMPETITIVE MARKET CLEARING (CMC) APPLE PRICE P^* for this economy, and a corresponding CMC APPLE OUTPUT LEVEL Q^* . That is, using just one graph with apple quantity on the horizontal axis and (unit) price of apples on the vertical axis, superimpose the true total supply function from Part B on top of the true total demand function from Part D. Then find a point (Q^*, P^*) such that, for the given price P^* , Total Apples Demanded = Total Apples Supplied = Q^* . Is there a unique CMC point for this example? Explain.

Part F: Using your graphical analysis in Part E, determine the NET SELLER SURPLUS and the NET BUYER SURPLUS at the particular CMC point (Q^*, P^*) that you have determined in Part E. Which side of the market (seller or buyer) attains a higher net surplus at this CMC point? Can you explain why?

Remark: An additional issue If the CMC point you determined in Part E is not unique, are your determinations of net seller surplus and net buyer surplus in Part F dependent on which CMC point you selected in Part E?

Table 1: Apple Reservation Prices for Sellers and Buyers

Apple Unit	Seller 1	Seller 2	Buyer 1	Buyer 2	Buyer 3
1	\$10.00	\$5.00	\$42.00	\$25.00	\$45.00
2	\$15.00	\$25.00	\$38.00	\$15.00	\$40.00
3	\$30.00	\$45.00	\$35.00	\$10.00	0
4	\$40.00	∞	0	0	0
5	\$45.00	∞	0	0	0
6	∞	∞	0	0	0
7	∞	∞	0	0	0
8	∞	∞	0	0	0