DEMAND ANALYSIS

February 25, 2021

Market Equilibrium

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$$= 8000 - 1000Px \tag{4}$$

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Market Supply

$$Qs_x = -40 + 20Px \tag{5}$$

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Market Supply

$$Qs_x = -40 + 20Px \tag{5}$$

No. of identical producers= 100

$$Qs_x = -40 + 20P_x \tag{6}$$
$$QS_x = 100(Qs_x) \tag{7}$$
$$-4000 + 2000P_x \tag{8}$$

Deriving Market Equilibrium price and quantity

In equilibrium,

$$QD_x = QS_x \tag{9}$$
$$8000 - 1000P_x \tag{10}$$
$$= -4000 + 2000P_x \tag{11}$$
$$12000 = 3000P_x \tag{12}$$
$$\tag{13}$$

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$P_x = \$4$ (equilibrium price)

Substitute equilibrium price either to demand equation nor supply equation

$$QD_x = 8000 - 1000(4) \tag{14}$$
$$= 8000 - 4000 \tag{15}$$
$$= 4000 \text{ (units of x)} \tag{16}$$

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Frame Title

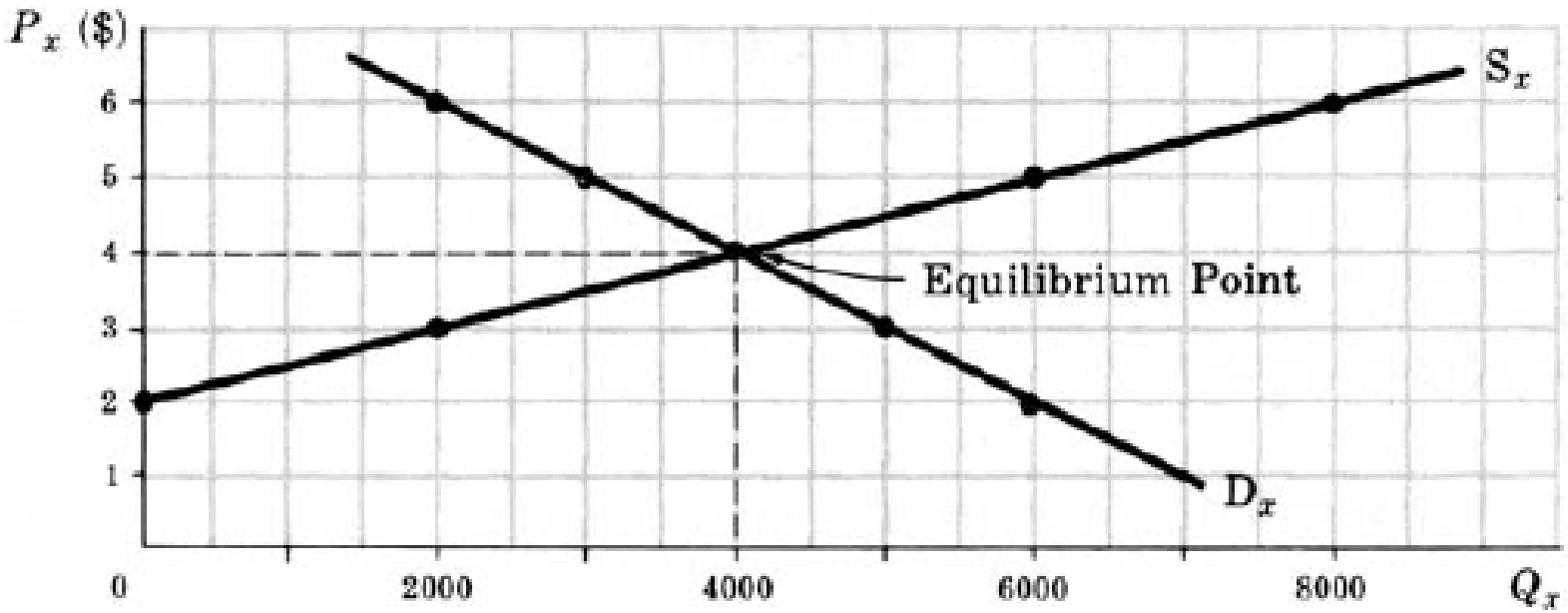

Figure 1: Equilibrium

PRICE ELASTICITY

$$e = -\frac{\Delta Q}{\Delta P} \cdot \frac{\Delta P}{\Delta Q} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \tag{17}$$

Point	Px ($)	Qx
A	8	0
B	7	1000
C	6	2000
D	5	3000
F	4	4000
G	3	5000
H	2	6000
L	1	7000
M	0	8000

Table 1: DEMAND SCHEDULE

Calculating price elasticity

From B to D;

$$e = \frac{Q_D - Q_B}{P_D - P_B} \cdot \frac{P_B}{Q_B} = -\frac{2000}{-2} \cdot \frac{7}{1000} = 7 \tag{18}$$

From D to B ?

Calculating price elasticity

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From D to B ?

Calculating price elasticity

Applying mid-point method; by taking average of two prices and average of two quantities;

$$e = -\frac{\Delta Q}{\Delta P} \cdot \frac{(P_B + P_D)/2}{(Q_B + Q_P)/2} = \frac{\Delta Q}{\Delta P} \cdot \frac{P_B + P_D}{Q_B + Q_D} \tag{19}$$

- e= ?

Cross Elasticity

$$e_{xy} = \frac{\Delta Q_x / Q_x}{\Delta P_y / Q_y} = \frac{\Delta Q_x}{\Delta P_y} \cdot \frac{P_y}{Q_x} \tag{20}$$

- If X and Y are substitutes, e_{xy} is positive.
- If X and Y are complements, e_{xy} is negative.

Calculating Cross Elasticity

	Before		After	
	Price (cents/cup)	**Quantity (cups/month)**	**Price (cents/cup)**	**Quantity (cups/month)**
Coffee	40	50	60	30
Tea	20	40	20	50

$$e_{xy} = \frac{\Delta Q_x / Q_x}{\Delta P_y / P_y} \tag{21}$$

$$= \frac{\Delta Q_x}{\Delta P_y} \cdot \frac{P_y}{Q_x} \tag{22}$$

$$= \left(\frac{+10}{+20}\right) \cdot \left(\frac{40}{40}\right) = +0.5 \tag{23}$$

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Calculating Cross Elasticity

	Before		After	
	Price (cents/cup)	**Quantity (cups/month)**	**Price (cents/cup)**	**Quantity (cups/month)**
Lemons	10	20	20	15
Tea	20	40	20	35

$$
\begin{aligned}
e_{xz} &= \frac{\Delta Q_x / Q_x}{\Delta P_z / P_z} \\
&= \frac{\Delta Q_x}{\Delta P_z} \cdot \frac{P_z}{Q_x} \\
&= \left(\frac{-5}{+10}\right) \cdot \left(\frac{10}{40}\right) = -0.125
\end{aligned}
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Consumer Equilibrium

- The objective of rational consumer is to maximize total utility derived from spending personal income.
- This objective is reached and the consumer is said to be in equilibrium when he is able to spend personal income in such a way that the utility of the last dollar spent on the various commodities is the same.
- This can be mathematically expressed by

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = ...$$

subject to the constraint that

$$P_x Q_x + P_y Q_y + ... = M$$

(the individual's income)

Deriving Consumer Equilibrium

Q	1	2	3	4	5	6	7	8
MUx	16	14	12	10	8	6	4	2
MUy	11	10	9	8	7	6	5	4

- Price of X = \$2
- Price of Y = \$1
- Income of the consumer = \$12
- above table shows MU of X and Y decreases continuously
- What is the total amount of utility received by the individual in equilibrium?

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- Maximum TU = 93 utils
- State mathematically the equilibrium condition for the consumer?

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Deriving Consumer Equilibrium

$Q_x = 3, Q_y = 6$

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = ... \tag{24}$$

$$P_x Q_x + P_y Q_y + ... = M \tag{25}$$

or

Deriving Consumer Equilibrium

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$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = ... \tag{24}$$

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or

$$\frac{(12)}{(\$2)} = \frac{(6)}{(\$1)} \tag{26}$$

$$(\$2)(3) + (\$1)(6) = \$12 \tag{27}$$

Example 2

- Price of x =$1
- Price of y =$1
- Income of the consumer =$8
- a) Indicate how this individual should spend her income in order to maximize her total utility.

Q	1	2	3	4	5	6	7	8	Total
MUx	11	10	9	8	7	6	5	4	60
MUy	19	17	15	13	12	10	8	6	100

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$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = ? \tag{28}$$

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$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = ? \tag{28}$$

- = (10)/ ($1)

$$P_x Q_x + P_y Q_y = ? \tag{29}$$

$$= (\$1)(2) + (\$1)(6) = \$8 \tag{30}$$

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- Maximum TU = 160 utils
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- $= (10)/\ (\$1)$

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