**Jaipuria Institute of Management Indore**

**PGDM Batch 2019 – 21, Term – I**

**Managerial Economics, ECO – 101**

**Mid – Term Exam, August 2019**

**Solution Set**

**Q: 1** Suppose in a metro city only taxicabs and privately owned automobiles are allowed to use the highway between the airport and the downtown. The market for taxicab service is competitive. There is a special lane for taxicabs, so taxis are always able to drive at a speed of 55 miles per hour. The demand for trip by taxicabs is given by

**Qd = 1000 – 400P + 50G – 4E** where, P = Taxi Fare; G = Price of Gasoline (fuel); E = Average speed of a trip by private automobile on the highway.

 The supply of trips by taxi is given by the equation: **Qs = 200 + 100P – 30G**

1. Interpret the slope parameter for P, G and E in the demand function. Are the algebraic signs correct for all three independent variables? Explain.
2. If G = $ 4 and E = 30 miles per hour, find the equilibrium taxi fare and quantity
3. Suppose government fixes a maximum fare of $ 1.5 on the said route, what shall be market outcome?
4. Suppose the taxicab drivers unanimously decide to charge a minimum fare of $ 3, what shall be the effect on market?
5. Suppose the average speed of private automobiles is allowed to increase, would it affect the demand for taxicabs? Show with the help of a graph.
6. How would increase in the price of gasoline affect the market equilibrium? Explain using a graph.

**[ 4 + 2 + 1 + 1 + 1 + 1 = 10 Marks ]**

**Solution:**

1. The slope of price P is -400, which means Price (Taxi Fare) and Qd (Demand for taxi cabs) are inversely related. If fare increases by one unit then, Quantity demanded of Cabs shall fall by 400 units. The algebraic sign is correct as by law of demand P and Qd exhibit an inverse relation keeping other factors constant.

The slope of G (price of fuel) is + 50, which means there is a direct relation between price of fuel and quantity demanded for taxi cabs. It says, If the price of fuel rises by 1 unit then the quantity demanded of Taxicabs shall rise by 50 units, which is correct as the fuel becomes costlier, people shall try to shift to taxicabs instead of driving their own automobiles, keeping other factors constant.

The slope of E (Average speed of a privately owned automobiles) is – 4, which means that there is an inverse relation between E and Qd of taxicabs. This is correct sign as it says if the private automobiles are allowed to increase their speed by one unit then Qd of taxicabs shall fall by 4 units as with an increased speed permission people may start preferring more of privately owned automobiles, thereby reducing Qd for taxicabs.

1. The Qd is given as **Qd = 1000 – 400 P + 50G – 4E**

Putting values G = 4, E = 30; we get:

Qd = 1000 – 400 P + 50 (4) – 4 (30)

Qd = 1080 – 400 P

Similarly, **Qs = 200 + 100P – 30G**

Putting G = 30, we get

Qs = 200 + 100 P – 30 (4)

Qs = 80 + 100 P

Now, at equilibrium: Qd = Qs

Therefore, 1080 – 400 P = 80 +100 P

* 500 P = 1000
* **P = $ 2, which is Equilibrium Price (Ans 1)**

Putting P = 2 in Qd: Qd = 1080 – 400 (2)

We get **Qd = Qs = Equilibrium Quantity = 280 units (Ans 2)**

1. If govt. fixes a maximum fare of $ 1.5 (Price Ceiling), which is less than the equilibrium price ($ 2) as calculated above then it shall result in a shortage of taxicabs in the market, which can be proved as follows:

At P = $ 1.5: Qd = 1080 – 400 P

* Qd = 1080 – 400 (1.5)
* Qd = 480 units, i.e Qd for taxicabs shall increase

Also, At P = $ 1.5: Qs = 80 + 100 P

* Qs = 80 + 100 (1.5)
* Qs = 230 units, i.e Qs for taxicabs shall decrease
* Qd > Qs
* **Condition of Shortage in taxicabs of: 480 – 230 = 250 units, therefore prices (taxi fare) will start increasing (Ans)**
1. If the taxicabs together decide a minimum fare of $ 3 **(Price Floor),** which is greater than the equilibrium price ($ 2) as calculated in part (b) then it shall result in a surplus of taxicabs in the market, which can be proved as follows:

At P = $ 3: Qd = 1080 – 400 P

* Qd = 1080 – 400 (3)
* Qd = -120 units, i.e Qd for taxicabs shall fall completely (No demand would now exist)

Also, At P = $ 3: Qs = 80 + 100 P

* Qs = 80 + 100 (3)
* Qs = 380 units, i.e Qs for taxicabs shall increase
* Qs > Qd
* **Condition of Surplus in taxicabs and therefore prices (fares) shall start falling (Ans)**
1. If the average speed of private automobiles is allowed to increase, then the overall demand for taxicabs will fall and the curve shall shift leftwards, resulting into a fall in equilibrium price as well as equilibrium quantity.
2. With the increase in the price of gasoline, overall demand for taxicabs shall rise (rightward shift in demand curve) and overall supply of Taxicabs shall fall (as price of input rises here) leading to a leftward shift in supply curve of taxicabs.

**The net result shall be a rise in equilibrium taxi fares, equilibrium quantity may rise or fall. (Ans)**

**Q: 2** The research department of the Corn Flakes Corporation (CFC) estimated the following regression for the demand of the cornflakes it sells:

**Qx = 1.0 – 2.0Px + 1.5I + 0.8Py – 3.0Pm + 1.0A**, where Qx = sales of CFC cornflakes, in millions of 250 gms boxes per year; Px = price of CFC cornflakes, in dollars per 250 gm box; I = personal disposable income, in trillions of dollars per year; Py = price of competitive brand of cornflakes, in dollars per 250 gm box; Pm = Price of milk, in dollars per litre; A = advertising expenditures of CFC cornflakes, in hundreds of thousands of dollars per year. If Px = $2, I = $4, Py = $ 2.50, Pm = $ 1, and A = $2.

1. Compute the sales of CFC cornflakes this year.
2. Analyze if this market is price elastic or inelastic?
3. Basis income elasticity, assess if cornflakes are normal goods, luxury goods or inferior goods?
4. Compute cross price elasticity of demand for the complimentary good milk.
5. Estimate the level of sales next year if CFC increases advertising by 20%, other factors remaining constant
6. If CFC decides to reduce prices by 10%, will it impact the quantity demanded? If yes, then by how much? The total revenue is expected to rise or fall in this case? Justify.

**[ 1 + 2 + 2 + 1 + 2 + 2 = 10 Marks ]**

**Solution:**

1. The sales of CFC this year can be calculated by putting all the given values in the equation: **Qx = 1.0 – 2.0Px + 1.5I + 0.8Py – 3.0Pm + 1.0A**

Qx = 1.0 – 2(2) + 1.5(4) + 0.8(2.5) – 3(1) + 1.0(2)

Qx = 1 - 4 + 6 + 2 – 3 + 2

Qx = 4 units

1. To analyze if the market is elastic or inelastic, we need to calculate Price Elasticity of Demand, which is given by the formula:

Ep = (ΔQ/ΔP) \* P/Q

Ep = -2 \* 2/4

Ep = -1

Taking mod value of Ep, we get |Ep |= 1, means the market is unit elastic.

1. Income Elasticity is given by:

Em = (ΔQ/ΔI) \* I/Q

Em = +1.5 \* 4/4

Em = + 1.5

Therefore, Em = +1.5 which is greater than one, means the market is income elastic and good under consideration is luxury good as Em > 1.

1. The cross price elasticity of demand for the complimentary good milk is given by:

Exm = (ΔQ/ΔPm) \* Pm/Q, where Pm = Price of milk

Exm = -3 \* 1/4

Exm = -3/4 = -0.75

Taking mod value of Exm, we get |Exm |= +0.75 which is less than 1. This means the market is relatively cross price inelastic in reference to milk.

1. For finding the solution, we need to first calculate Advertisement Elasticity, which is given as:

Eadv. = (ΔQ/Δadv exp.) \* adv. exp./Q

Eadv. = +1 \* 2/4

Eadv. = + 0.5

Therefore, Eadv. = +0.5 which is less than one, means the market is relatively advertisement inelastic.

Now, if the advertisement expenses are increased by 20 %, it shall increase the quantity demanded by a lesser percentage, as follows:

Eadv. = % ΔQd / %ΔAdv, Exp.

* + 0.5 = %ΔQd / +20%
* %ΔQd = 0.5 \* 20%
* %ΔQd = 10%

 That is the Qd qill rise by only 10 %, even if the adv. expenses are increased by 20 %, since the market is relatively advertisement inelastic.

1. The market for CFC cornflakes is unit elastic as calculated in part (b) above.

Which means Ep = -1

Now, if the price is decreased by 10%, then total revenue shall remain unchanged as follows:

Ep = %ΔQd / %ΔPx

* -1 = %ΔQd / -10%
* %ΔQd = -1 \* (-10)%
* %ΔQd = 10%
* So, Qd shall also rise by 10% only, resulting in no change in TR.

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