Faculty of Information Technology

University of Moratuwa

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Batch 20

IS 1020 – Principles of Economics

Econocode: Assignment Two – Individual

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Question

Suppose the demand and supply curves for a product sold in a competitive market are resented by the following equations.

Demand equation: $Q_D = 100 - 2P$ Supply equation: $Q_S = -30 + 3P$

    I.   Give minimum values to draw the graph.

   II.   Find the equilibrium price and the quantity for the product.

  III.   Calculate the price elasticity of demand and price elasticity of supply at the market equilibrium and identify the PED and PES.

  IV.   Find the Excess demand and Excess supply curves for the product.

   V.   Calculate following

        a. Maximum demand Price

        b. Minimum supply Price

        c. the economic surplus

        d. Producer surplus

        e. Economic surplus.

Calculation

(i)

P	QD	QS
0	100	-30
50	0	120

(ii)

QD = QS

100-2P = -30+3P

5P = 130

P = 130/5

P = 26

QD = 100-2P

= 100 – 2×26

= 48

QS = -30 +(3×26)

= 48

Equilibrium price is 26

Equilibrium quantity is 48

(iii)

Price Elasticity of demand = $\Delta Qd/\Delta P \times P/Q$

= -2 × 26/48

= - 1.08

Price Elasticity of supply = $\Delta Qs/\Delta P \times P/Q$

$= 3 \times 26/48$

$= \underline{1.625}$

Price Elasticity of Demand is -1.08 - **For this product, PED is inelastic**

Price Elasticity of Supply is 1.625 - **For this product, PES is elastic**

(iv)

Exd = Qd – Qs

$= 100 – 2P – (-30 + 3P)$

$= 100 – 2P +30 - 3P$

$= \underline{130 – 5P}$

Exs = Qs– Qd

$= -30 + 3P – (100 – 2P)$

$= -30 + 3P – 100 + 2P$

$= -\underline{130 +5P}$

Excess Demand curve

Exd = 130 - 5 p

Excess Supply curve

Exs = -130 + 5 p

(v)

Maximum demand price

QD = 100 – 2P

$0 = 100 – 2P$

$2P = 100$

$P = 100/2$

P = 50

Consumer Surplus = [(50 – 26) × 48] / 2

= 576

Minimum supply price

QS = -30 + 3P

0 = -30 + 3P

-3P = -30

P = -30 / -3

P = 10

Producer Surplus = [(26 – 10) × 48] / 2

= 384

Economic Surplus = 576 + 384

= 960

Consumer Surplus is 576

Producer Surplus is 384

Economic Surplus is 960

Pseudo Code

BEGIN

    DISPLAY "if Qd = a - bp & Qs = - a + bp, "

    DISPLAY "(No need to enter sign of the values)"

    INPUT "enter the 'a' for Qd: -" into aQd
    INPUT "enter the 'b' for Qd: -" into bQd
    DISPLAY Demand equation

    INPUT "enter the 'a' for Qs: -" into aQs
    INPUT "enter the 'b' for Qs: -" into bQs
    DISPLAY Supply equation

    DISPLAY "Outputs"
    DISPLAY"_____"

    DISPLAY "--"
    DISPLAY "| P | QD | QS |"
    DISPLAY "--"
    DISPLAY "| 0 | aQd | aQs |"
    DISPLAY "| (aQd /bQd) | 0 | (aQd /bQd) *bQs - aQs |"
    DISPLAY "--"

    equilibriumPrice = (aQd + aQs) / (bQd + bQs)
    DISPLAY equilibrium price

    equilibriumQuantity = aQd – bQd * equilibriumPrice
    DISPLAY equilibrium Quantity

Price elasticity of demand =bQd * equiPrice / equiQuantity

Price elasticity of supply =bQs * equiPrice / equiQuantity

DISPLAY "Price elasticity of demand = -'", ped

DISPLAY "Price elasticity of supply ='", pes

IF (ped EQUAL TO 0) THEN

 DISPLAY ("For this product, PED is perfectly inelastic")

IF (ped < 1) THEN

 DISPLAY ("For this product, PED is inelastic ")

IF (ped EQUAL TO 1) THEN

 DISPLAY ("For this product, PED is unitary elastic")

IF (ped > 1) THEN

 DISPLAY ("For this product, PED is elastic")

IF (equiQuantity = 0) THEN

 DISPLAY ("For this product, PED is perfectly elastic ")

IF (pes EQUAL TO 0) THEN

 DISPLAY ("For this product, PES is perfectly inelastic")

IF (pes < 1) THEN

 DISPLAY ("For this product, PES is inelastic ")

IF (pes EQUAL TO 1) THEN

 DISPLAY ("For this product, PES is unitary elastic")

IF (pes > 1) THEN

 DISPLAY ("For this product, PES is elastic")

IF (equiQuantity = 0) THEN

 DISPLAY ("For this product, PES is perfectly elastic ")

DISPLAY Excess Demand = (aQd + aQs), '-' , (bQd + bQs),'p'

DISPLAY Excess Supply = '-', (aQd + aQs), '+' , (bQd + bQs),'p'

Maximum Demand Price = aQd / bQd

Minimum Supply Price = aQs / bQs

DISPLAY Maximum Demand Price

DISPLAY Minimum Supply Price

Consume surplus = (Maximum Demand Price -equiPrice)/2*equiQuantity

DISPLAY Consume surplus

Producer surplus = (equiPrice- Minimum Supply Price)/2*equiQuantity

DISPLAY Producer surplus

Economic surplus = Consume Surplus + Producer Surplus

DISPLAY Economic surplus

Source Code

Programming Language: - Python

```python
print("If Qd = a - bp & Qs = - a + bp, \n")
print("(No need to enter sign of the values) \n\n")
aQd=int(input('Enter the a for Qd: \n'))
bQd=int(input('Enter the b for Qd: \n'))

print('\n Qd=',aQd,'-',bQd,'p')

aQs=int(input('\nEnter the a for Qs:  \n'))
bQs=int(input('Enter the b for Qs:  \n'))

print('\n Qs= -',aQs,'+',bQs,'p\n\n')

print("OUTPUTS")
print("_____\n")


print("-------------------------------")
print("|    P    |    QD    |    QS    |")
print("-------------------------------")
print("|    0    |    ",aQd,"    |   -",aQs,"    |")
print("|   ",(aQd /bQd),"  |     0     |   ",(aQd /bQd) *bQs - aQs," |")
print("-------------------------------")

equiPrice = (aQd + aQs) / (bQd + bQs)
print('\n\nEquilibrium Price=',equiPrice)

equiQuantity = aQd - bQd * equiPrice
print('\nEquilibrium Quantity=',equiQuantity)


ped=bQd*equiPrice/equiQuantity
pes=bQs*equiPrice/equiQuantity
print('\n\nPrice Elasticity of Demand =   -',ped)
print('\nPrice Elasticity of Supply = ', pes)
```

```python
m=-abs(ped) # -abs converts positive no to negative no
if m==0:
    print("\n\nFor this product, PED is perfectly inelastic")
if m < 1:
    print("\n\nFor this product, PED is inelastic ")
if m==1:
    print("\n\nFor this product, PED is unitary elastic")
if m > 1:
    print("\n\nFor this product, PED is elastic")
if equiQuantity == 0:
    print("\n\nFor this product, PED is perfectly elastic ")


if pes==0:
    print("\nFor this product, PES is perfectly inelastic")
if pes < 1:
    print("\nFor this product, PES is inelastic ")
if pes==1:
    print("\nFor this product, PES is unitary elastic")
if pes > 1:
    print("\nFor this product, PES is elastic")
if equiQuantity == 0:
    print("\nFor this product, PES is perfectly elastic ")



print('\n\nExd=',(aQd+aQs),'-', (bQd+bQs),'p')
print('\nExs= -',(aQd+aQs),'+', (bQd+bQs),'p')



maxDemandPrice =aQd/bQd
minSupplyPrice =aQs/bQs
print('\n\nMaximum DemandPrice=',maxDemandPrice)
print('\nMinimum SupplyPrice=',minSupplyPrice)

consumeSurplus=(maxDemandPrice-equiPrice)/2*equiQuantity
print('\n\nConsumer surplus=',consumeSurplus)

producerSurplus=(equiPrice-minSupplyPrice)/2*equiQuantity
print('\nProducer surplus=',producerSurplus)

economicSurplus = consumeSurplus+producerSurplus
print('\nEconomic surplus=',economicSurplus)
```

Output

```
>>>
========== RESTART: C:\Users\T.M.K.L.THENNAKOON\Desktop\Python\econ.py =========
If Qd = a - bp & Qs = - a + bp,

(No need to enter sign of the values)


Enter the a for Qd:
100
Enter the b for Qd:
2

 Qd= 100 - 2 p

Enter the a for Qs:
30
Enter the b for Qs:
3

 Qs= - 30 + 3 p


OUTPUTS
_____

--------------------------------
|    P    |    QD    |    QS    |
--------------------------------
|    0    |   100    |  - 30    |
|   50.0  |    0     |  120.0   |
--------------------------------


Equilibrium Price= 26.0

Equilibrium Quantity= 48.0


Price Elasticity of Demand =  - 1.0833333333333333

Price Elasticity of Supply =  1.625
```

```
--------------------------------
|   P   |    QD    |    QS    |
--------------------------------
|   0   |   100    |  - 30    |
|  50.0 |    0     |  120.0   |
--------------------------------


Equilibrium Price= 26.0

Equilibrium Quantity= 48.0


Price Elasticity of Demand =  - 1.0833333333333333

Price Elasticity of Supply =  1.625


For this product, PED is inelastic

For this product, PES is elastic


Exd= 130 - 5 p

Exs= - 130 + 5 p


Maximum DemandPrice= 50.0

Minimum SupplyPrice= 10.0


Consumer surplus= 576.0

Producer surplus= 384.0

Economic surplus= 960.0
>>> |
```