Exercise ME-101

Finding a market equilibrium

The Economic Skills Project

1 Problem

Problem

The market supply and demand for a good are given by the willingness to accept and willingness to pay curves below, where Q^S and Q^D are the quantities supplied and demanded:

Supply $WTA = 40 + \frac{1}{5}Q^S$

Demand $WTP = 1030 - 2Q^D$

What is the market price and quantity?

2 Answer

Answer

Here's the solution:

- $P = 130$
- $Q = 450$

3 Method

Solution method

Here's one approach:

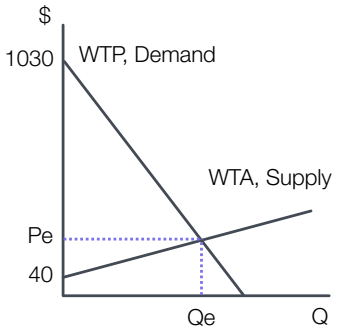
1. Draw the market diagram
2. Derive the supply curve $Q^S(P)$
3. Derive the demand curve $Q^D(P)$
4. Solve for the price where $Q^S = Q^d$
5. Solve for the quantity supplied
6. Check by solving for the quantity demanded

4 Solution

4.1 Step 1

Draw the market diagram

Here's how it looks:



4.2 Step 2

Derive the supply curve $Q^S(P)$

Sellers facing price P choose Q^S where:

- $WTA = P$

Inserting the WTA equation and solving for Q^S:

- $40 + \frac{1}{5}Q^s = P$
- $\frac{1}{5}Q^S = P - 40$
- $Q^S = 5(P - 40)$
- $Q^S = 5P - 200$

4.3 Step 3

Derive the demand curve $Q^D(P)$

Buyers facing price P choose Q^D where:

- $WTP = P$

Inserting the WTP equation and solving for Q^D:

- $1030 - 2Q^D = P$
- $1030 = P + 2Q^D$
- $1030 - P = 2Q^D$
- $\frac{1}{2}(1030 - P) = Q^D$
- $Q^D = 515 - \frac{1}{2}P$

4.4 Step 4

Solve for the price where $Q^S = Q^d$

Inserting the supply and demand equations into the equilibrium condition $Q^S = Q^D$ and solving for P:

- $Q^S = Q^D$
- $5P - 200 = 515 - \frac{1}{2}P$
- $5.5P = 715$
- $P = 130$

4.5 Step 5

Solve for the quantity supplied

Inserting the equilibrium price into the supply equation:

- $Q^S = 5P - 200$
- $Q^S = 5(130) - 200$
- $Q^S = 450$

4.6 Step 6

Check by solving for the quantity demanded

To check, use the demand equation to compute the quantity demanded. It should be the same as the quantity supplied.

- $Q^D = 515 - \frac{1}{2}P$
- $Q^D = 515 - \frac{1}{2}130$
- $Q^D = 450$

Everything checks - done!