Assigning Ownership to the Waivers

Distribution of property rights

- Distribute randomly
- 10 waivers total

Fairness?

- Equal distribution *ex ante*:
  - 10/32 chance

- Unequal distribution *ex post*:
  - Either owner or not

Collecting Information about Traders

Survey via Google Classroom

Two sets of questions:

1. **Maximum** willingness to pay (**WTP**) to get waivers
2. **Minimum** willingness to accept (**WTA**) to sell waiver

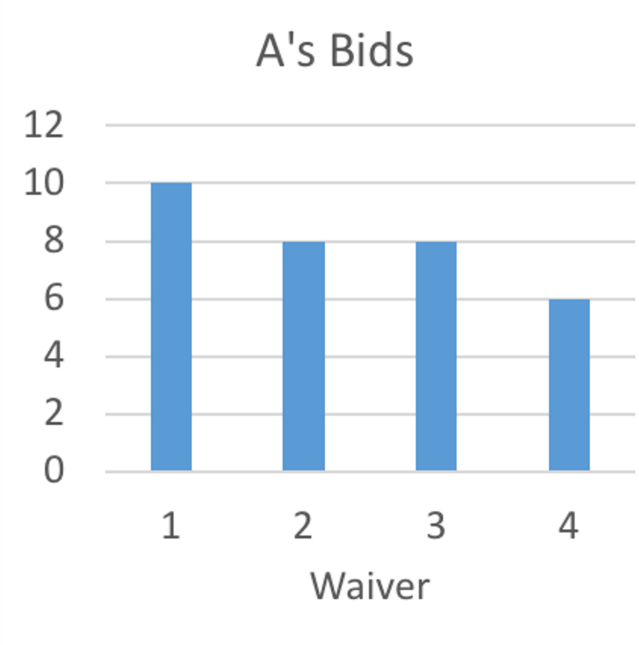
When filling in the form:

- Playing for real money
- Round to nearest dollar
- Leave WTA blank if you're not an owner

Individual Demand

Start by graphing **WTP** bids for person A

Will use Excel to construct and then paste below.



Height: WTP for a particular waiver

$WTP(Q)$ = WTP for waiver number Q

A's WTP for waiver 2 is $WTP_A(2) =$ 8

A's WTP for waiver 3 is $WTP_A(3) =$ 8

WTP for several waivers?

Add up WTP's for individual waivers

WTP for N waivers:

$$\sum_{i}^{N} \mathrm{WTP}(Q_i)$$

Example: A's WTP for waivers 1 & 2

$$WTP_A(1) + WTP_A(2) = \quad 10+8=18$$

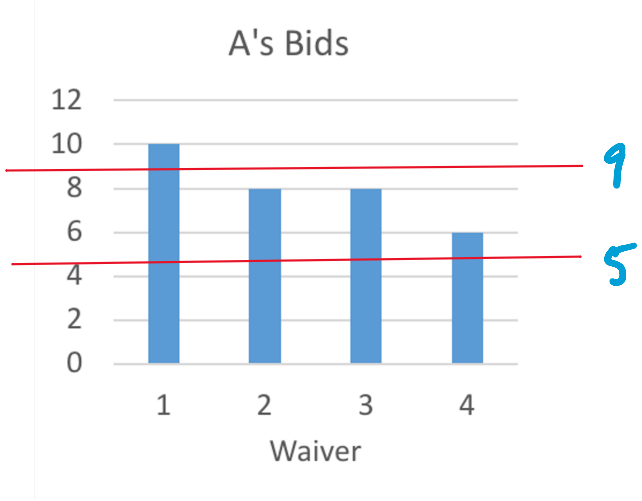
Can also find quantity A would **buy** at a given price P:

A's decision rules:

Buy any units with $WTP_A > P$ (net gain)
Buy any units with $WTP_A = P$ (indifferent)
Don't buy units with $WTP_A < P$

Result: A's demand curve: $Q_A^D(P)$

Suppose $P = 5$



Waiver	WTP	P	Net	Buy?
1	10	5	5	✓
2	8	5	3	✓
3	8	5	3	✓
4	6	5	1	✓

P=5, Q=4
P=9, Q=1

Gain on purchased waivers is consumer surplus (CS)

Consumer surplus (CS) on a single waiver i:

$$CS_i = WTP_i - P$$

Consumer surplus on purchase of N waivers:

$$CS = \sum_{i}^{N} CS_i$$

5 + 3 + 3 + 1 = 12

Third use of data beyond $WTP(Q)$ and $Q^D(P)$:

Marginal benefit (MB) of *giving* someone a unit

Take to be equal to what they would have been WTP:

$$MB_i = WTP_i$$

Market Demand

Market demand is the sum of individual demands:

$$Q_M^D = \sum_i^N Q_i^D(P)$$

We'll compute it in Excel for three people: A, B and C

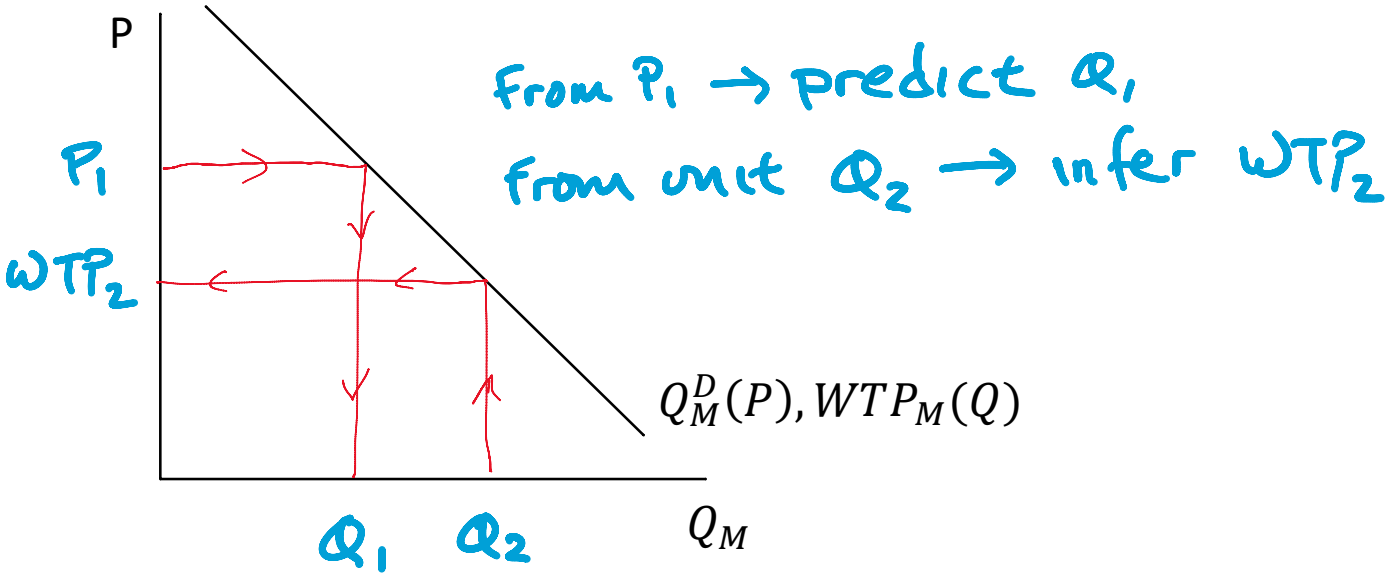
Width of curve:

$Q_M^D(P)$ = quantity demanded at a given P

Height of curve:

$WTP_M(Q_i)$ = WTP by the buyer of unit Q_i

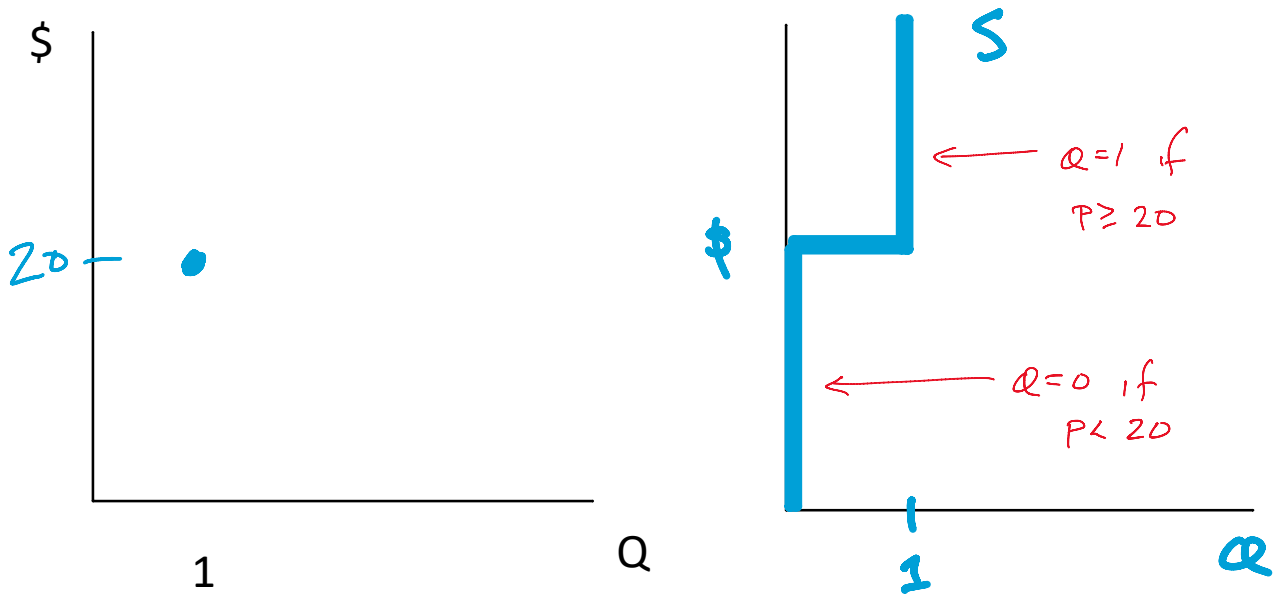
Abstract, stylized market demand:


P
P_1
WTP_2
$Q_M^D(P), WTP_M(Q)$
Q_1
Q_2
Q_M
From P_1 → predict Q_1
From unit Q_2 → infer WTP_2

Individual Supply

Start by graphing **WTA** bids for person E

Picking someone from data: $WTA_E =$ 20



Height: WTA for the waiver

Can also find quantity E would **sell** at a given price P:

E's decision rules:

Sell if $P > WTA_E$ (net gain)
Sell if $P = WTA_E$ (indifferent)
Don't sell if $P < WTA_E$

Result: E's supply curve: $Q_E^S(P)$

Gain on sold waivers is producer surplus (PS)

Producer surplus (PS) on a single waiver i:

$$PS_i = P - WTA_i$$

Producer surplus on sales of N waivers:

$$PS = \sum_{i}^{N} PS_i$$

Market Supply

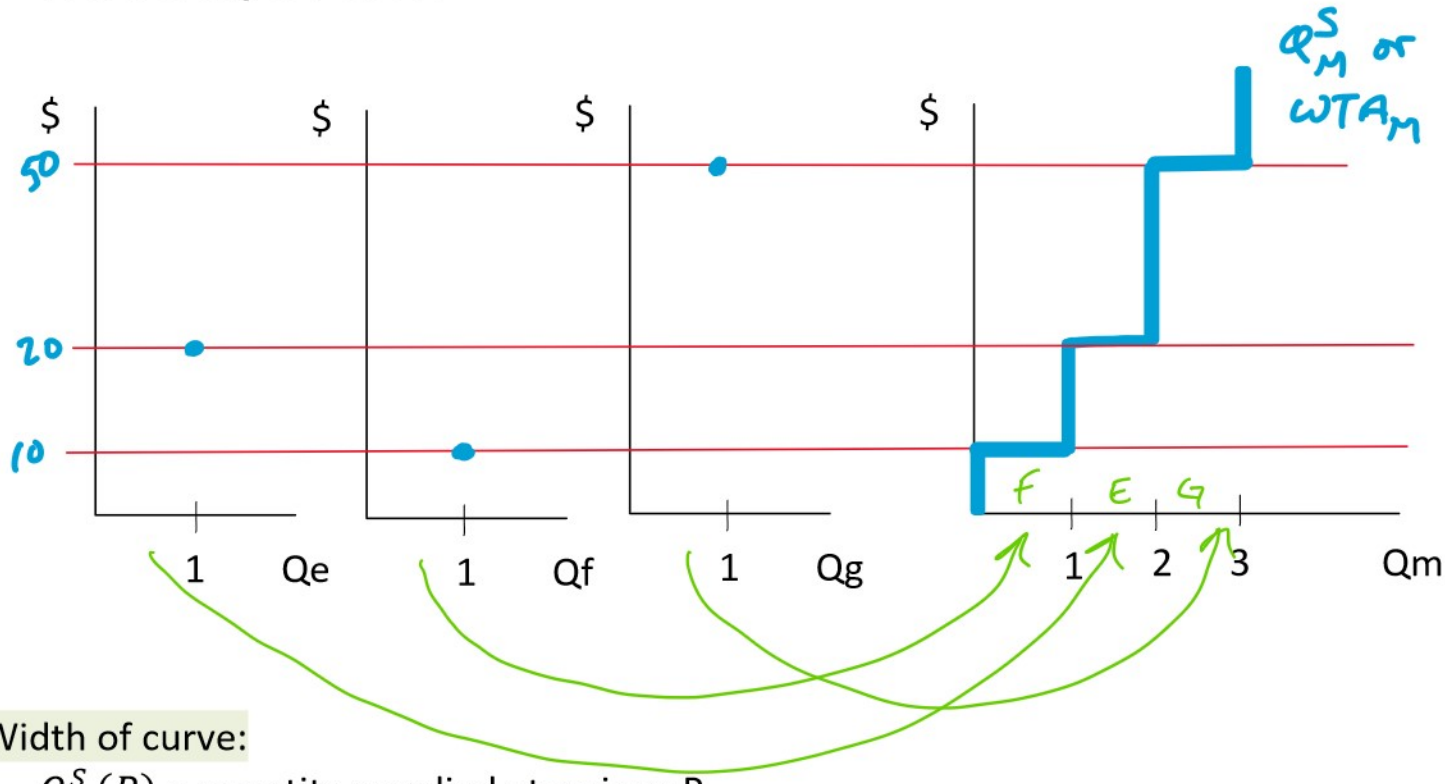
Market supply is the sum of individual supplies:

$$Q_M^S = \sum_i^N Q_i^S(P)$$

Extracting 2 more WTA bids:

$WTA_E = 20$
$WTA_F = 10$
$WTA_G = 50$

Constructing the curve:



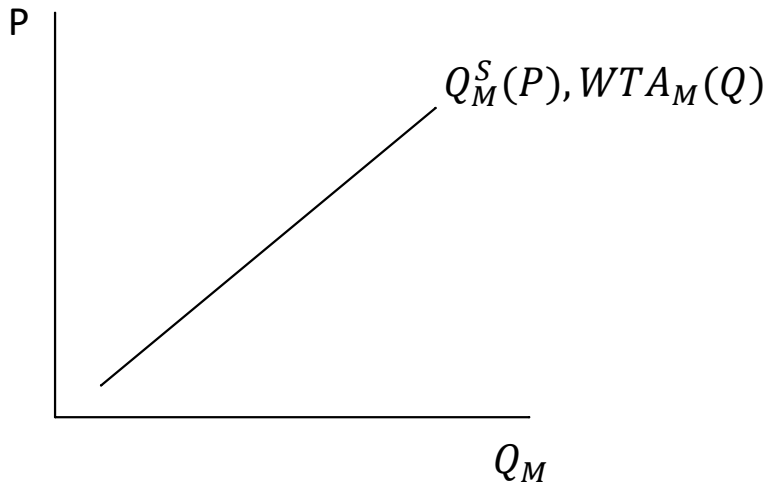
Width of curve:

$Q_M^S(P)$ = quantity supplied at a given P

Height of curve:

$WTA_M(Q_i)$ = WTA by the seller of unit Q_i

Abstract, stylized market supply:



Market Equilibrium

Now have market demand and supply:

Demand	Supply
$Q_M^D(P)$	$Q_M^S(P)$

Give the Qs demanded or supplied for every possible price P

Can use to find *equilibrium price* P^* where Qs are equal:

$$Q_M^D(P^*) = Q_M^S(P^*)$$

Equilibrium:

P is stable: no forces pushing it up or down

Resulting Q is the *equilibrium quantity* Q^*:

$Q_M^D(P^*) = Q_M^S(P^*) = Q^*$

Other prices are **not** stable:

Case 1: P_1 below P^*

Buyers want more:	$Q_M^D(P_1) > Q^*$
Sellers sell less:	$Q_M^S(P_1) < Q^*$

$Q_M^D(P_1) > Q_M^S(P_1)$

- Excess **demand** → $Q_M^D - Q_M^S$
- Price will tend to **rise**

Case 2: P_2 above P^*

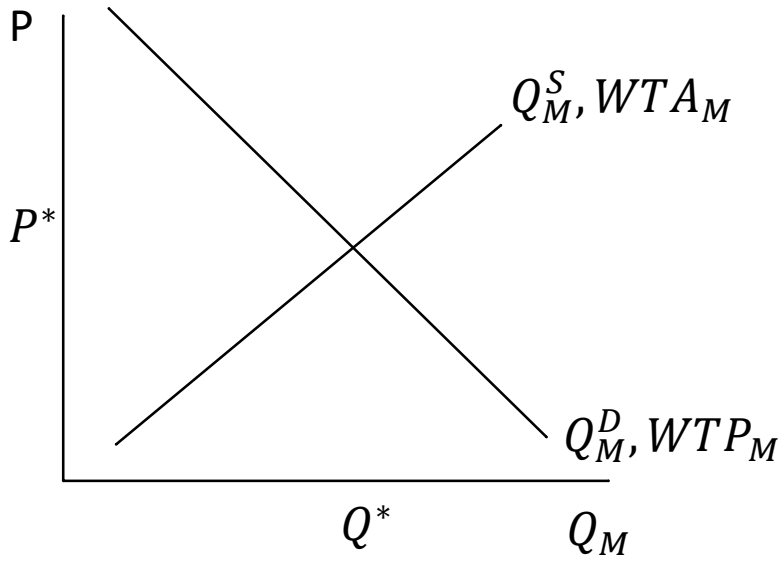
Buyers want less:	$Q_M^D(P_2) < Q^*$
Sellers sell more:	$Q_M^S(P_2) > Q^*$

$$Q_M^D(P_2) < Q_M^S(P_2)$$

- Excess **supply** → $Q_M^S - Q_M^D$
- Price will tend to **fall**

Finding P^* and Q^* graphically:

Draw market demand and supply on same axis:



Finding P^* and Q^* algebraically:

Solve either equation:

1. $Q_M^D(P^*) = Q_M^S(P^*)$ Demand equals supply
2. $WTP_M(Q^*) = WTA_M(Q^*)$ WTP equals WTA