

*The Workings of a Market:  
A Laboratory Perspective on Economic Systems*

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Another way to see this is to sort the individual values to get a single value schedule.

Buyer 1	
Unit	Value
1 <sup>st</sup>	\$9
2 <sup>nd</sup>	\$6
3 <sup>rd</sup>	\$3

+

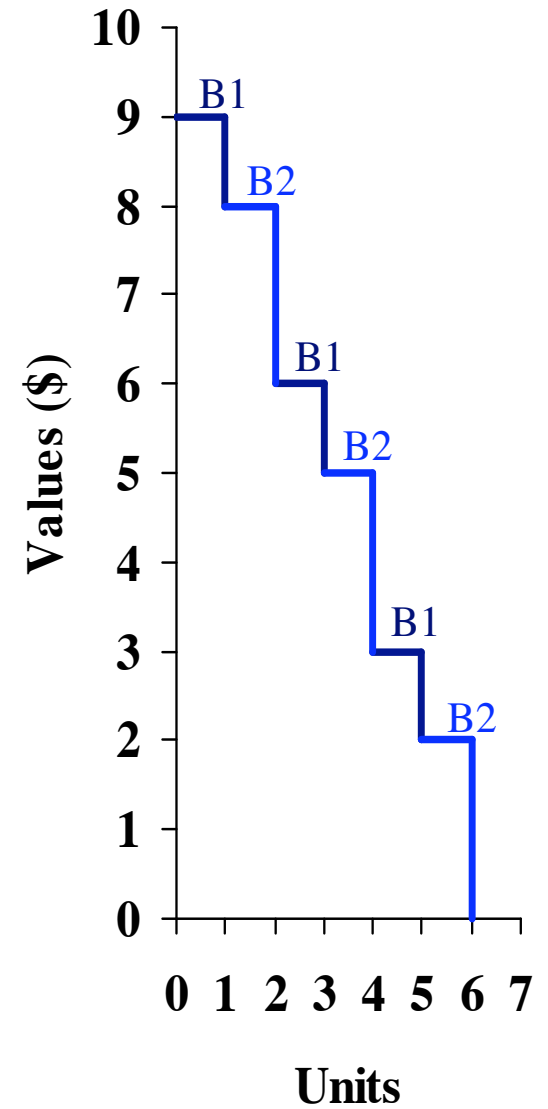
Buyer 2	
Unit	Value
1 <sup>st</sup>	\$8
2 <sup>nd</sup>	\$5
3 <sup>rd</sup>	\$2

**=**

All Buyers	
Unit	Value
1 <sup>st</sup>	\$9
2 <sup>nd</sup>	\$8
3 <sup>rd</sup>	\$6
4 <sup>th</sup>	\$5
5 <sup>th</sup>	\$3
6 <sup>th</sup>	\$2



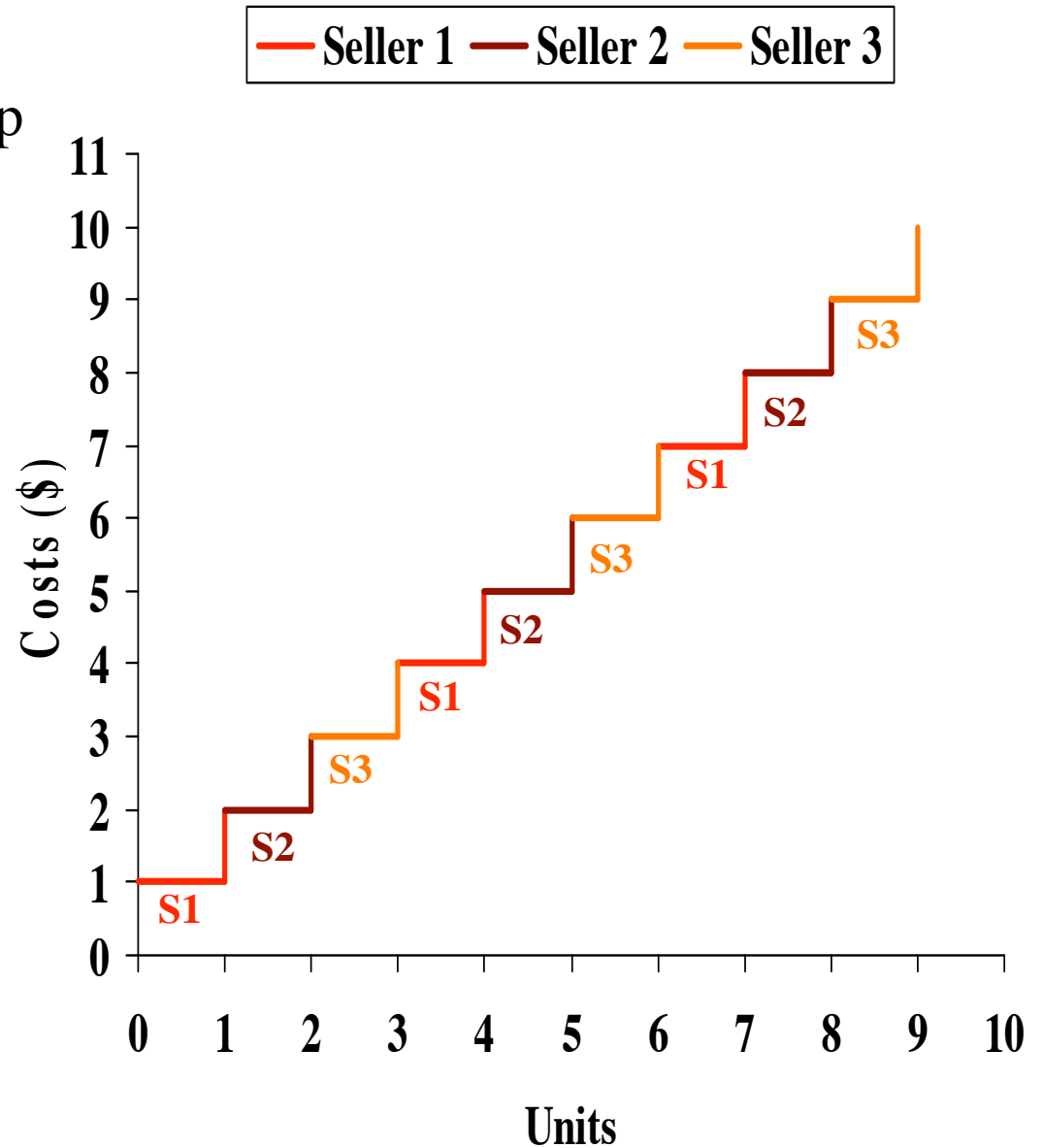
— Buyer 1 — Buyer 2



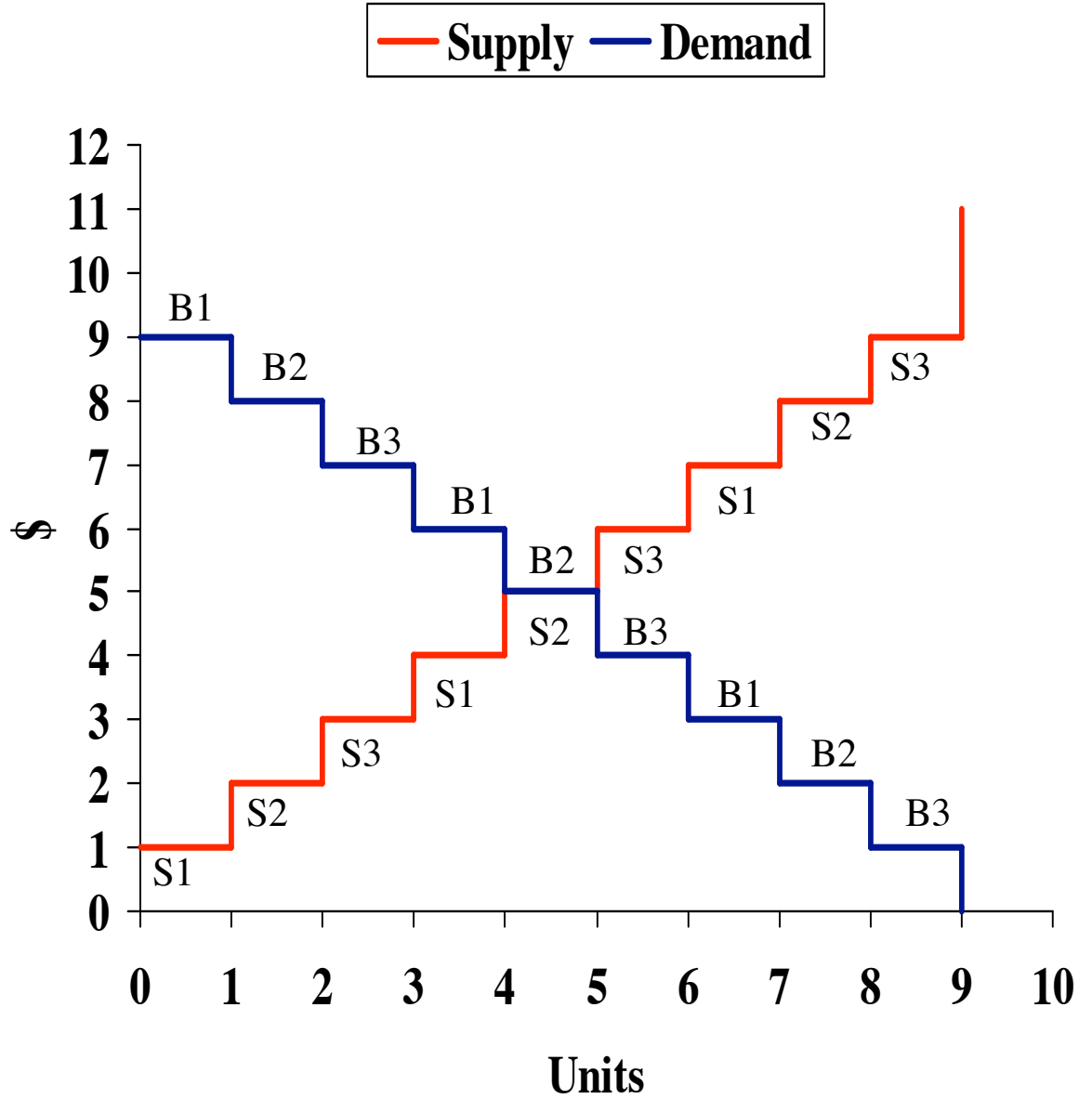
Just like for buyers we can add up all of the individual seller's cost schedules.

Seller 1				Seller 2	
Unit	Cost			Unit	Cost
1 <sup>st</sup>	\$1			1 <sup>st</sup>	\$2
2 <sup>nd</sup>	\$4	+		2 <sup>nd</sup>	\$5
3 <sup>rd</sup>	\$7			3 <sup>rd</sup>	\$8

Seller 3			
Unit	Cost		
1 <sup>st</sup>	\$3		
2 <sup>nd</sup>	\$6	=	
3 <sup>rd</sup>	\$9		



We can now combine the supply and demand graphs together in one picture like this.

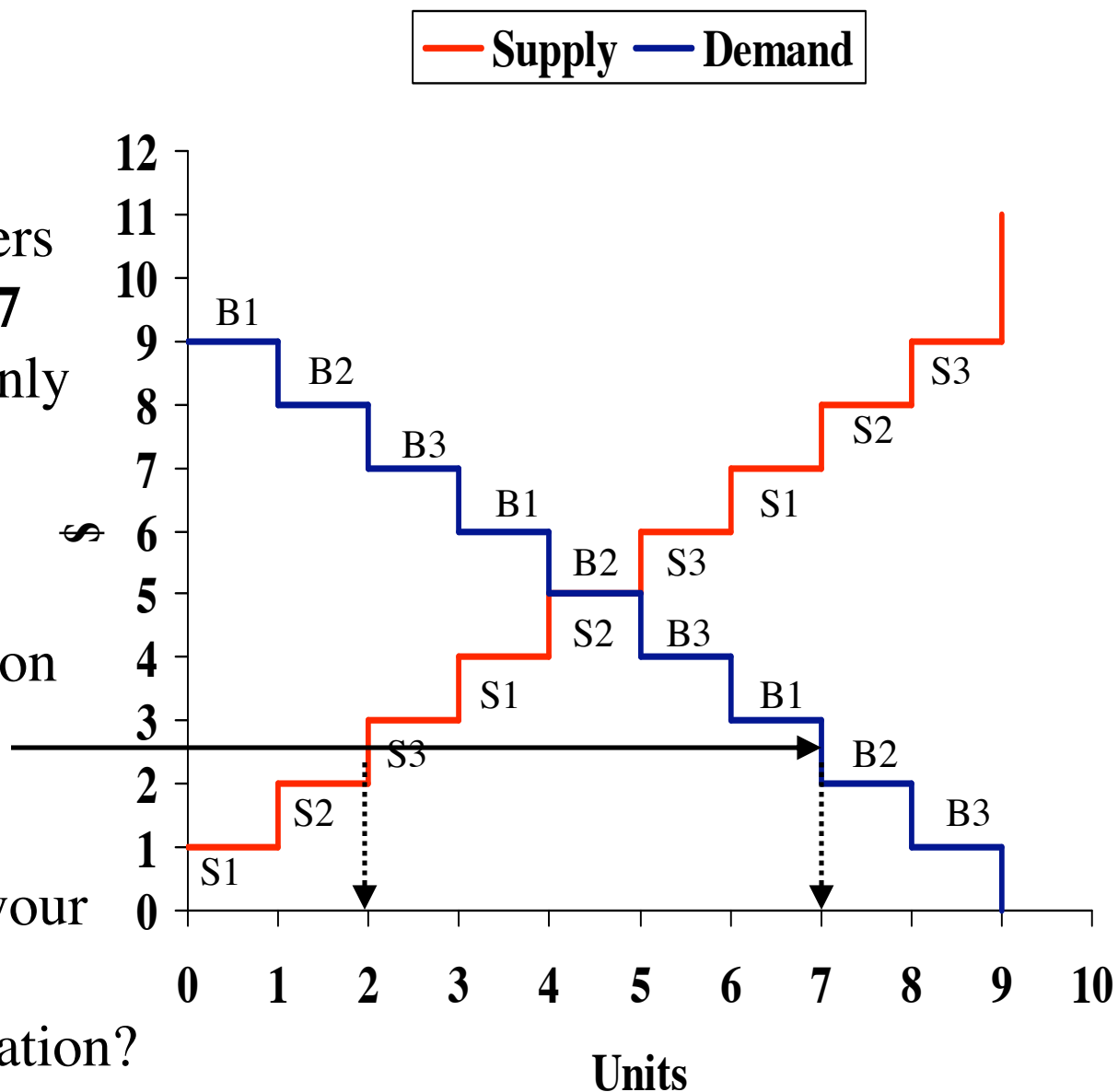


### *Excess Demand*

At a price of \$2.50 buyers are willing to purchase **7** units while sellers are only willing to sell **2** units.

We call this a condition of excess demand.

What did you do in your market when you experienced this situation?

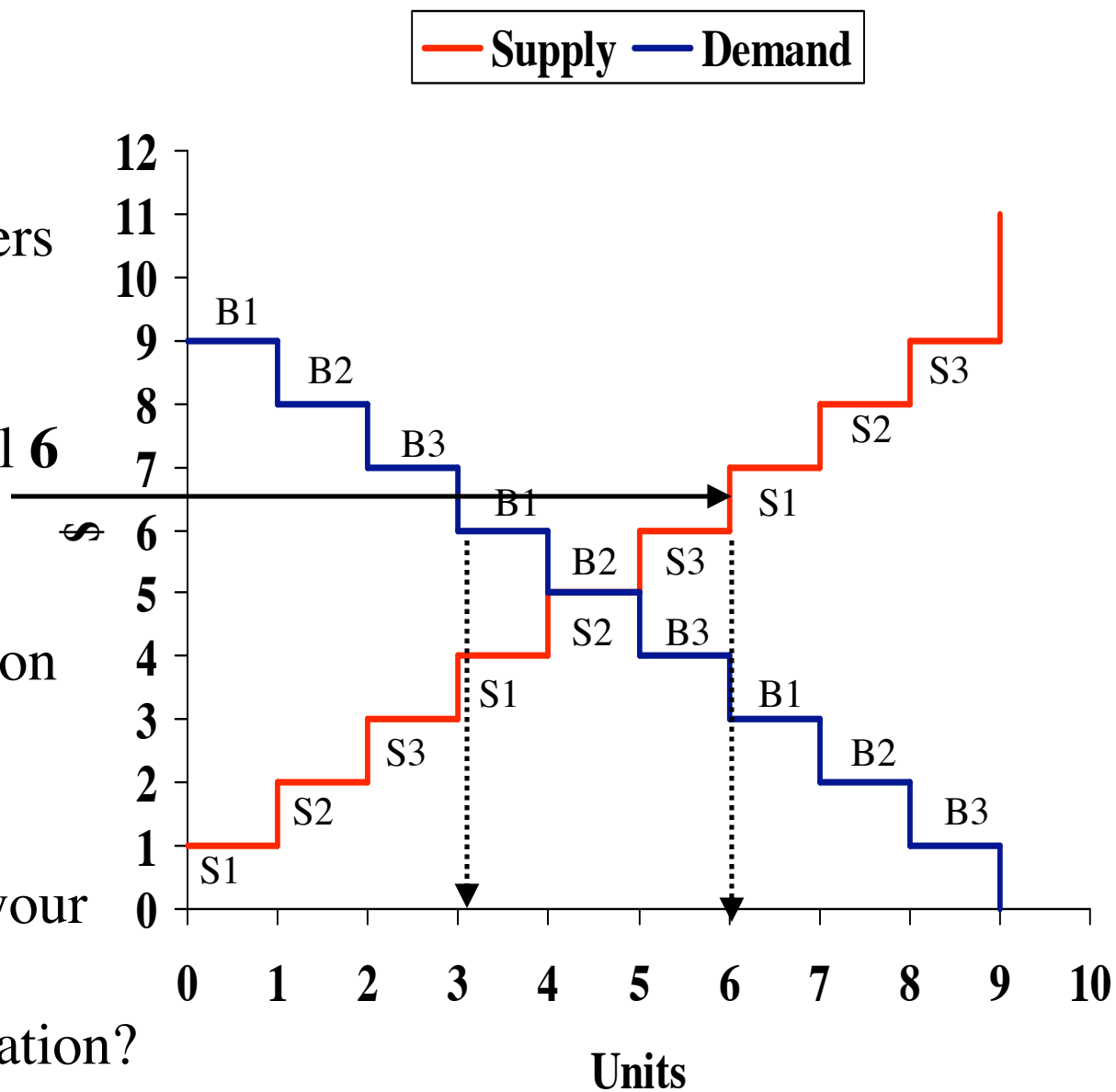


### *Excess Supply*

At a price of \$6.50 buyers are only willing to purchase **3** units while sellers are willing to sell **6** units.

We call this a condition of excess supply.

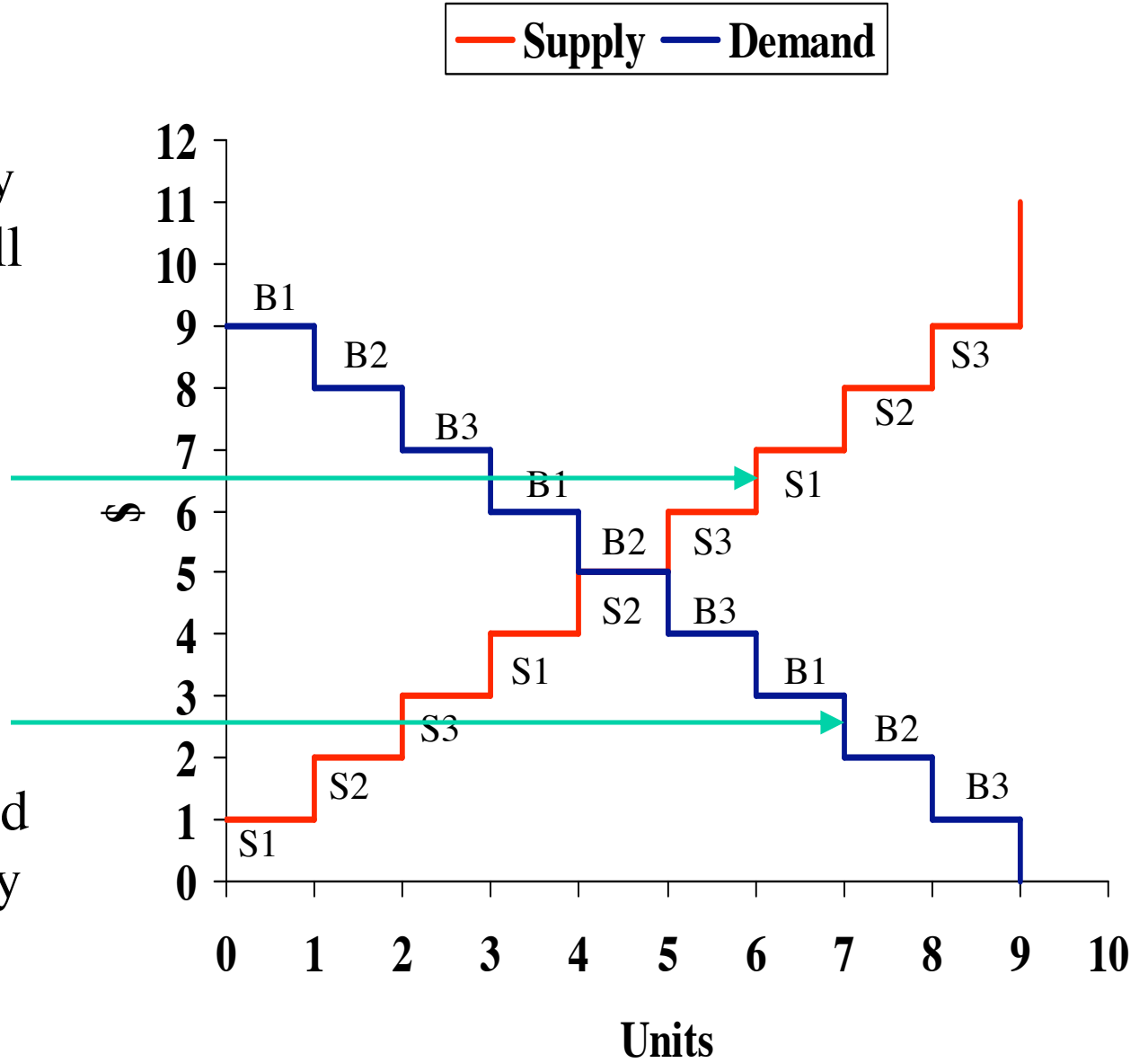
What did you do in your market when you experienced this situation?



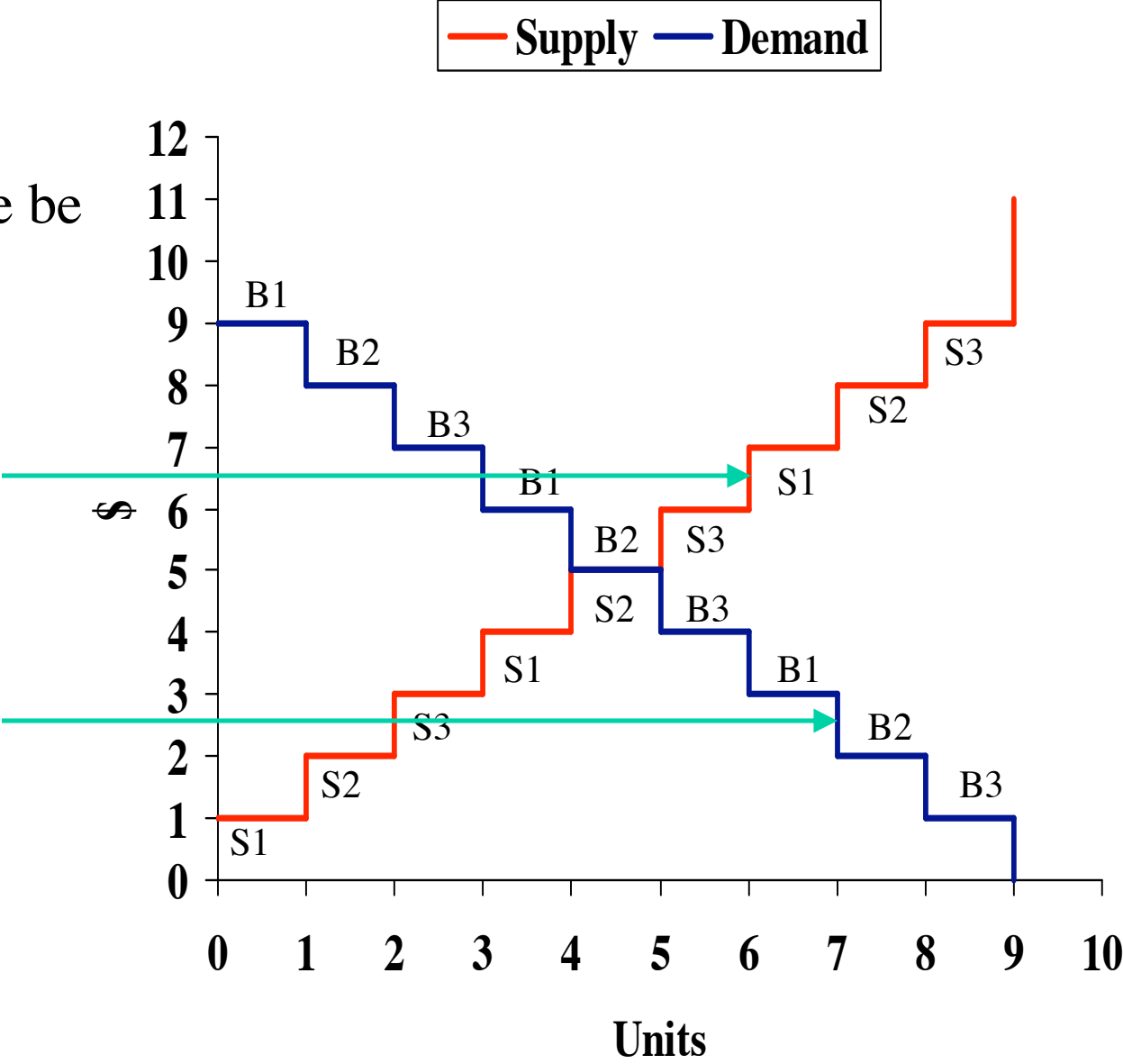
Under excess supply  
sellers who can't sell  
will tend to ask for  
a lower price.



Under excess demand  
buyers who can't buy  
will tend to bid the  
price up.



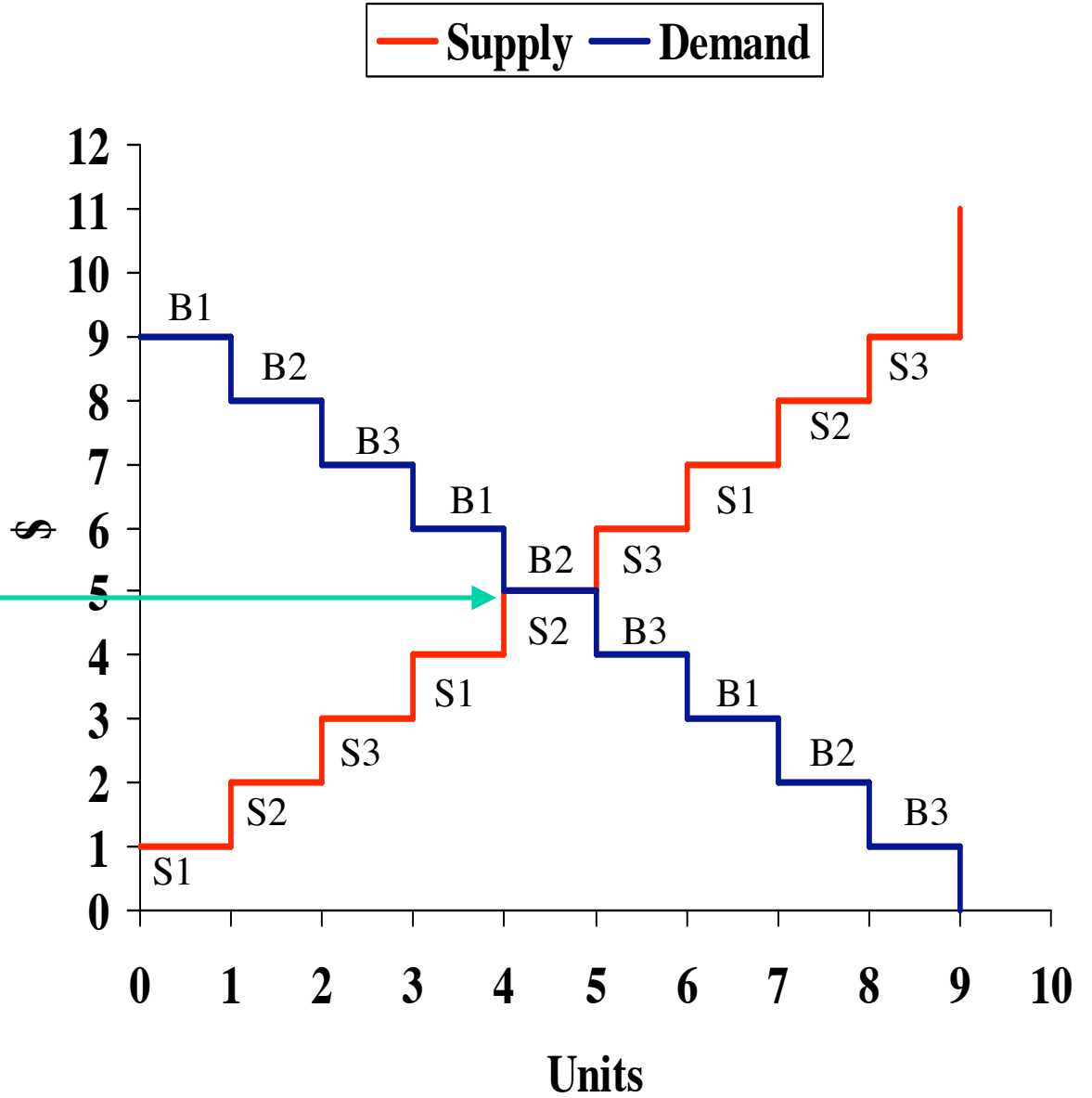
When will the price be in equilibrium?



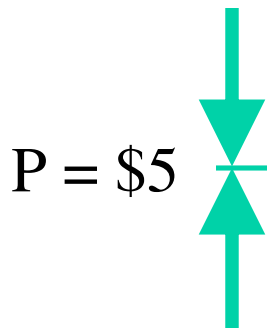
When will the price be in equilibrium?



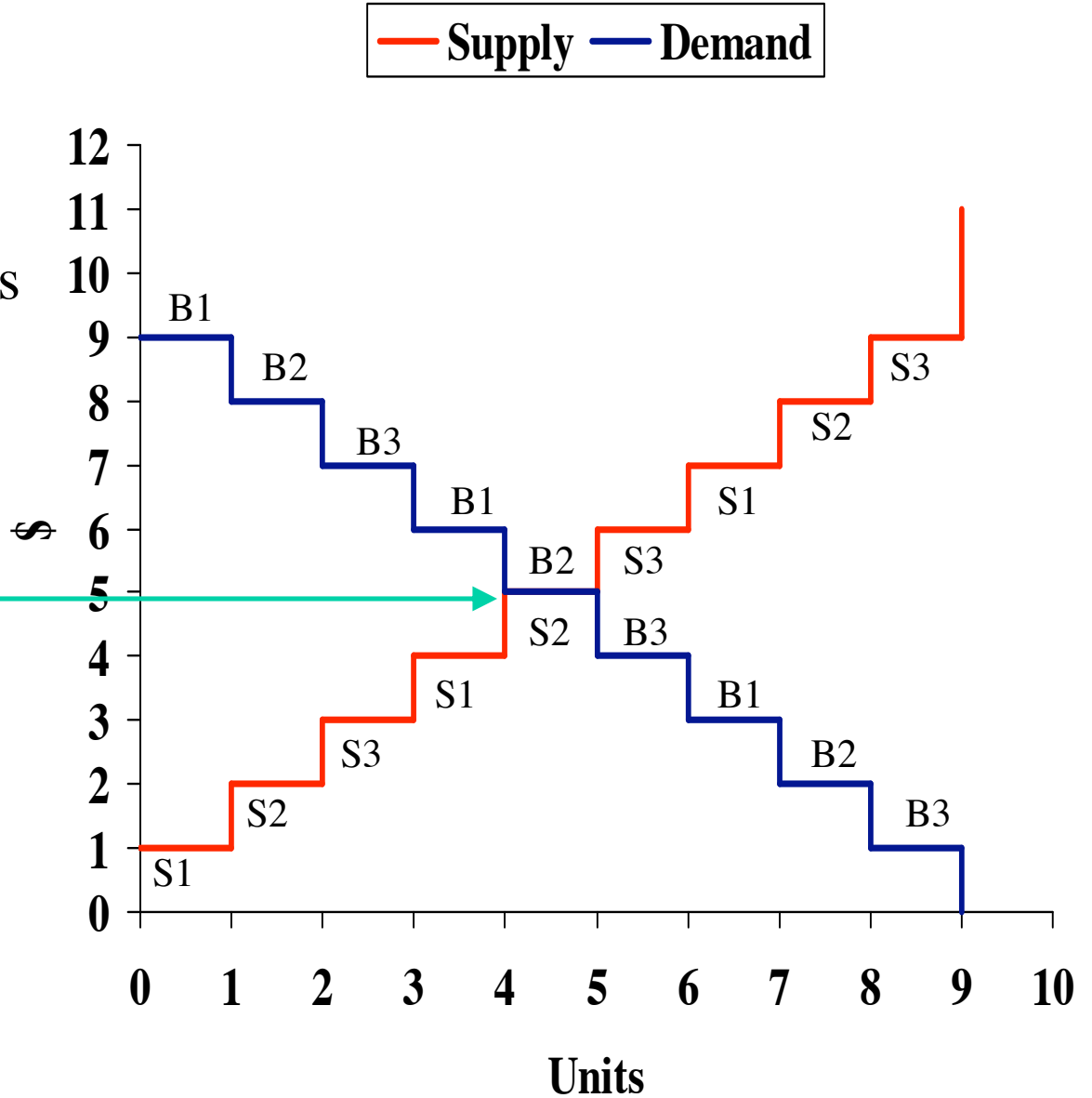
When excess demand and excess supply are zero.



We call this a *competitive equilibrium*, or, the price at which the quantity demanded equals the quantity supplied.



Buyers want to buy 5 units and sellers want to sell 5 units.

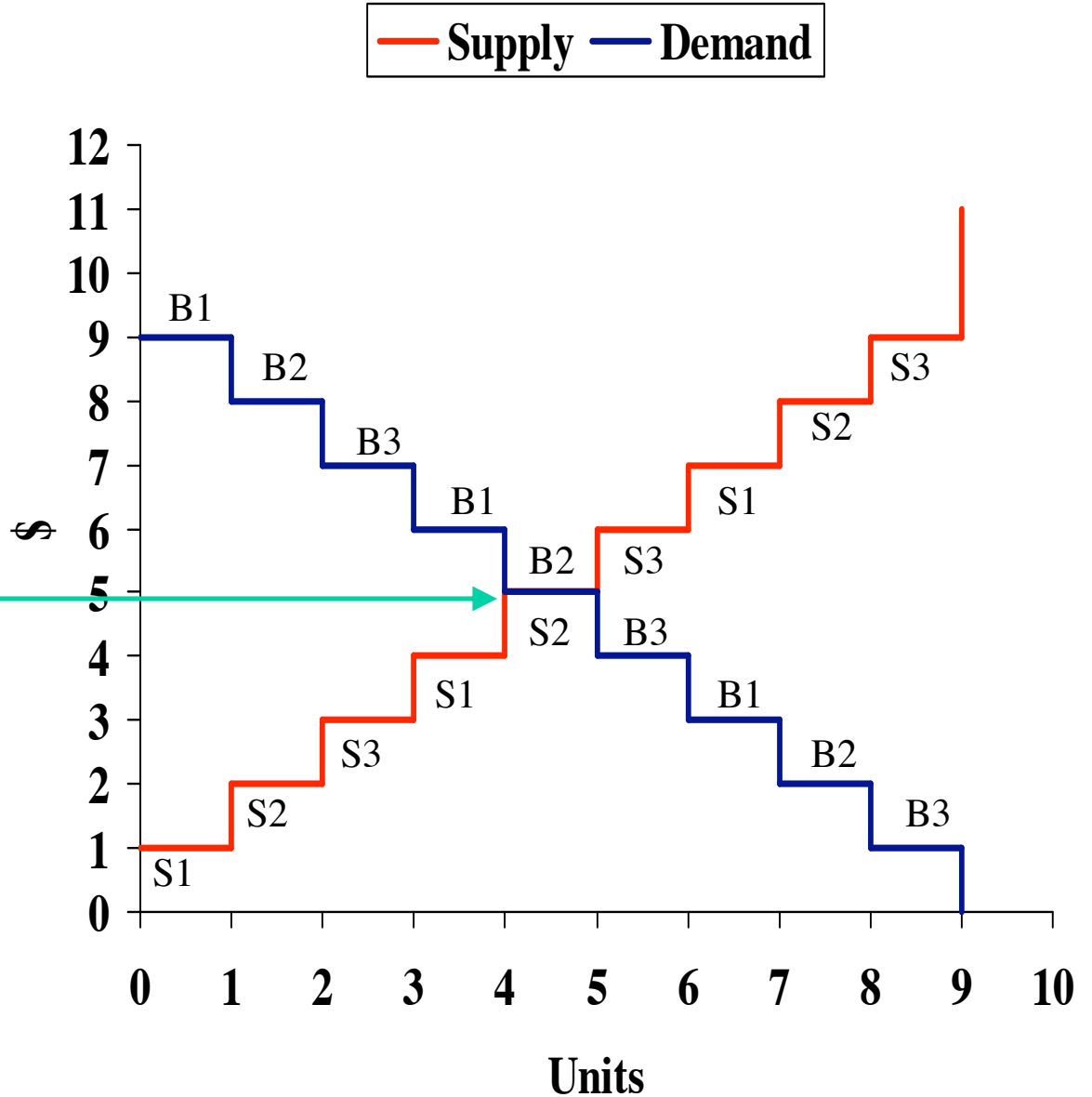


*Competitive equilibrium* is a theory in economics since it predicts how prices behave.

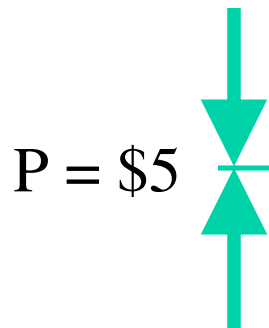
$P = \$5$



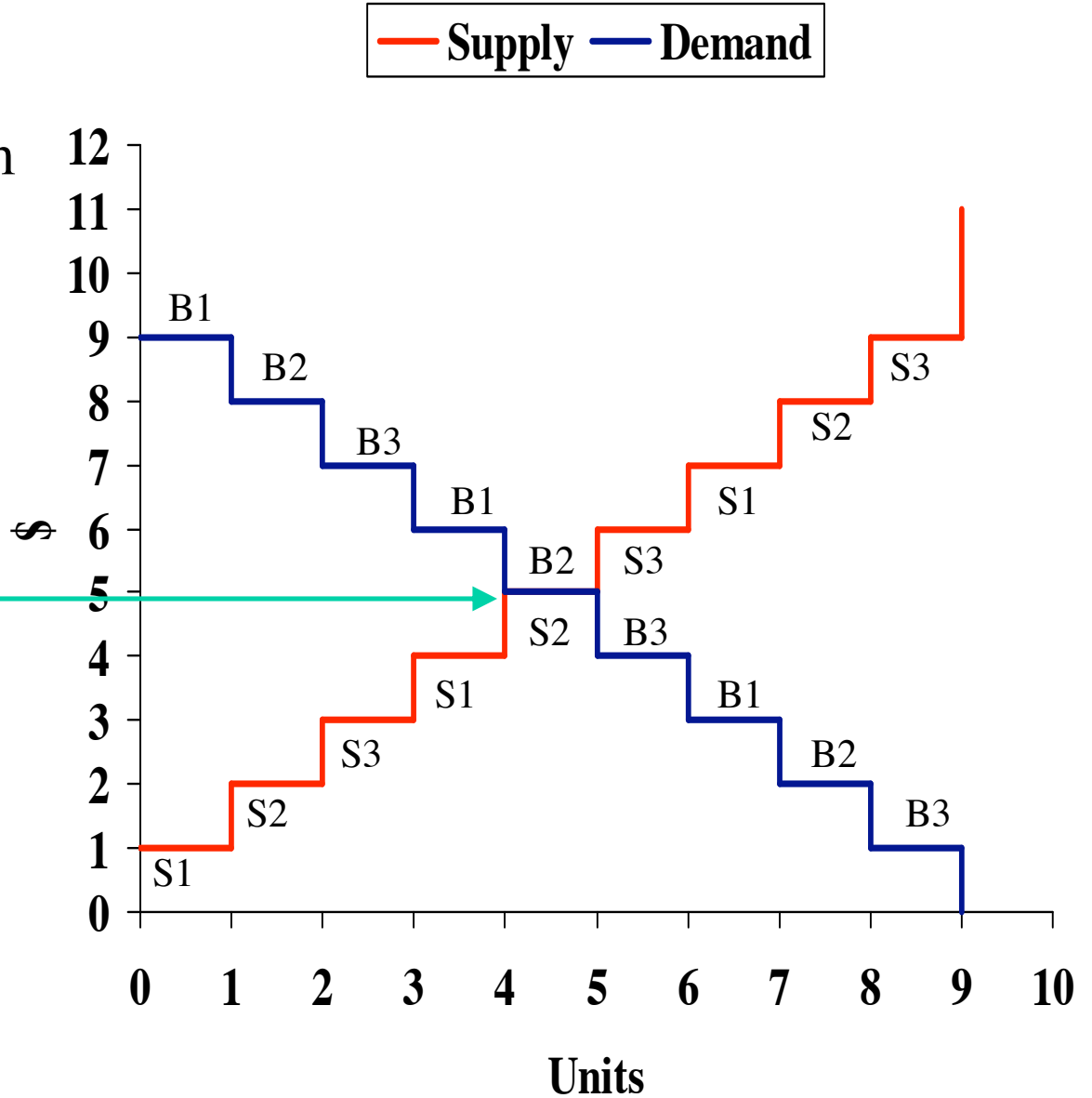
It also predicts how prices will change with changes in supply and demand.



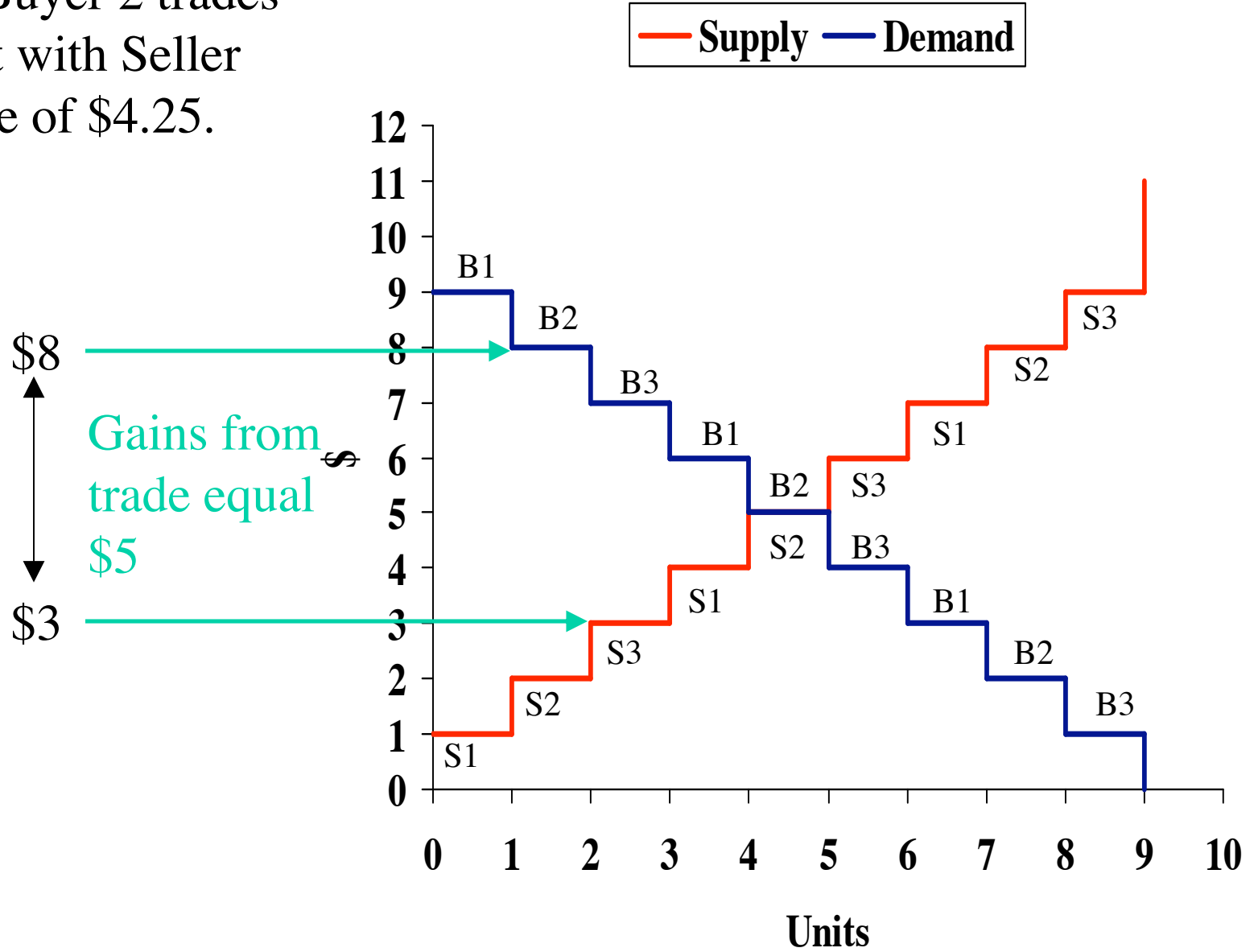
A competitive equilibrium also predicts that the resulting trades will be efficient.



But what is meant by *efficient* or *efficiency*?



Suppose Buyer 2 trades a first unit with Seller 3 at a price of \$4.25.



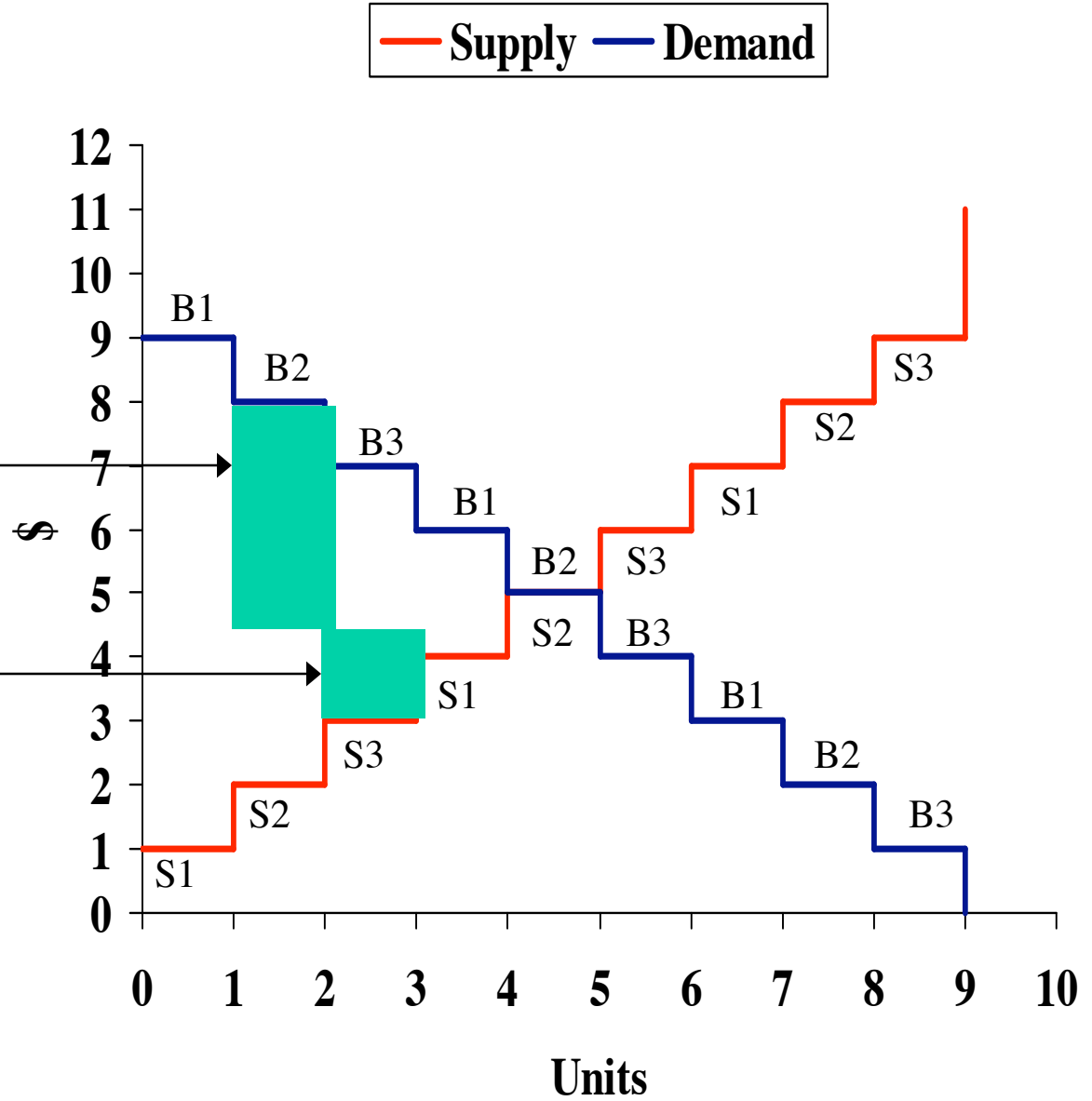
Suppose Buyer 2 trades a first unit with Seller 3 at a price of \$4.25.

Buyer 2's profit or *consumer surplus* is  $\$8 - 4.25 = \$3.75$ .

Seller 3's profit or *producer surplus* is  $\$4.25 - 3.00 = \$1.25$ .

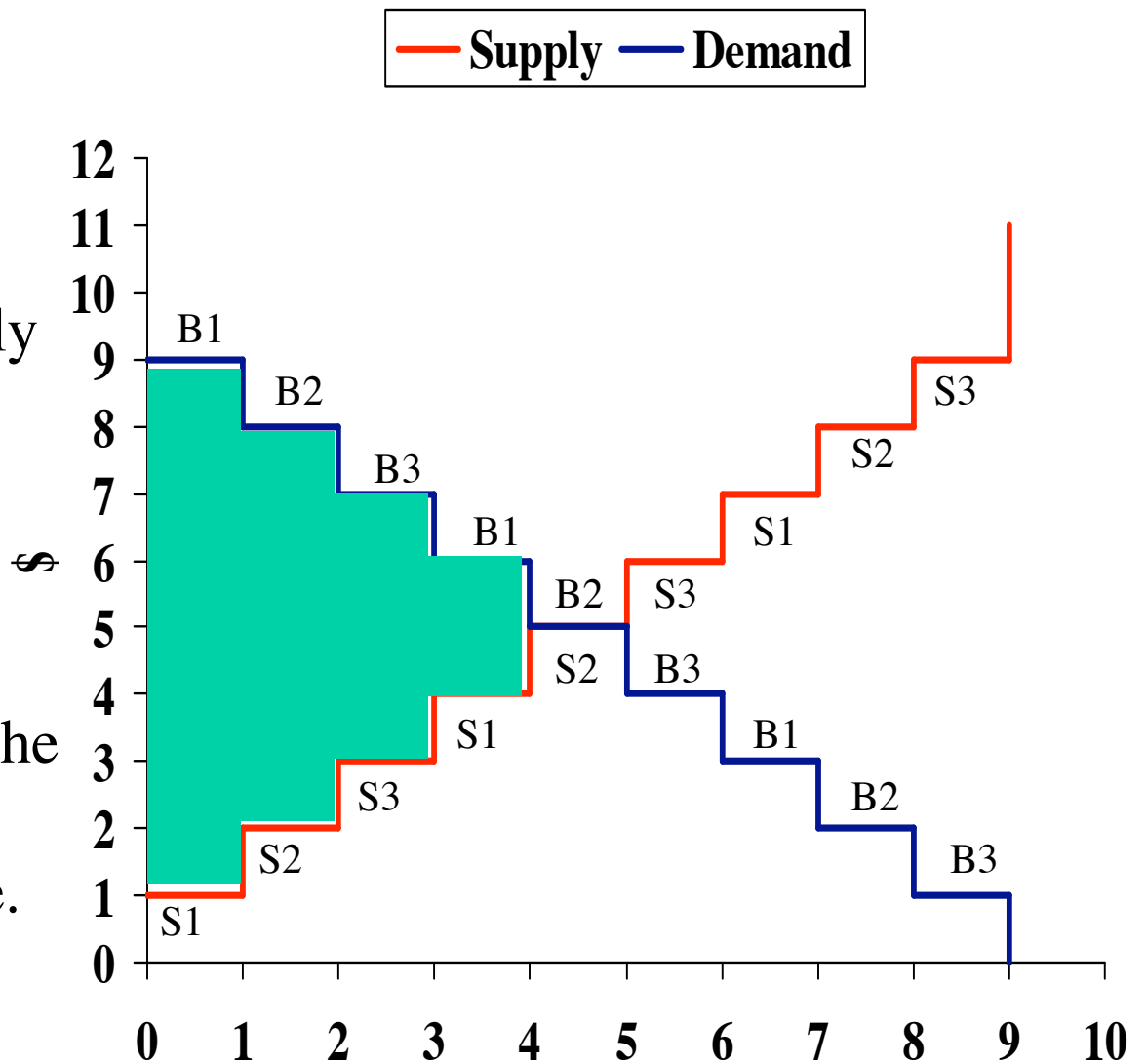
*Surplus* is a measure of the gains from trade.

Both buyers and sellers gain from a trade.



*Consumer Surplus* is the difference between what customers are willing to pay and what they actually pay.

*Producer Surplus* is the difference between what the sellers receive and what they are willing to receive.



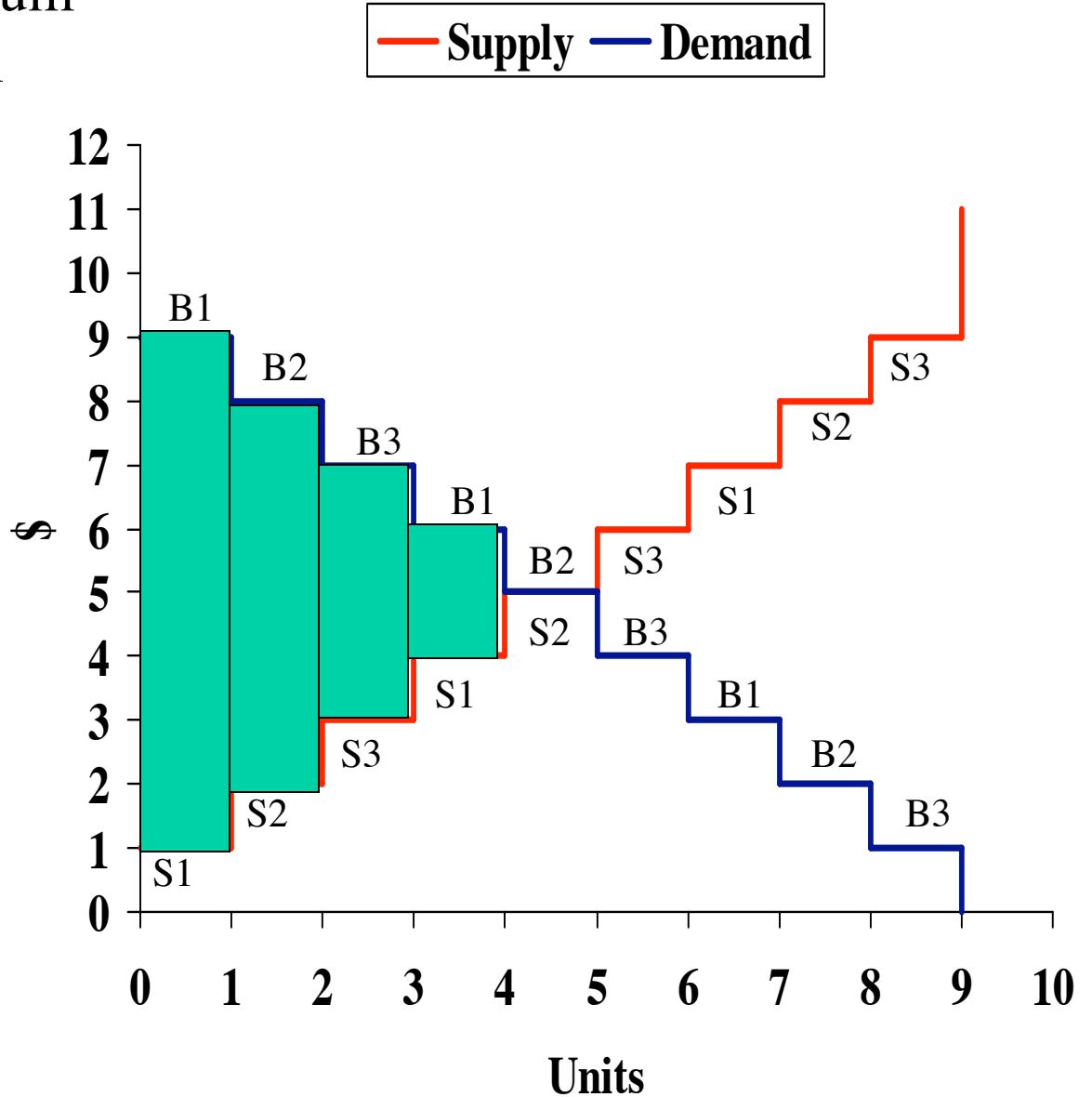
*Total Surplus* = Producer + Consumer surplus. Units

At the competitive equilibrium price of \$5, B1 and B2, will each buy two units, and B3 will buy one unit.

Also, S1 and S2 will each sell 2 units, and S3 will sell one unit.

Total gains from trade (or *surplus*) are given by the green shaded area.

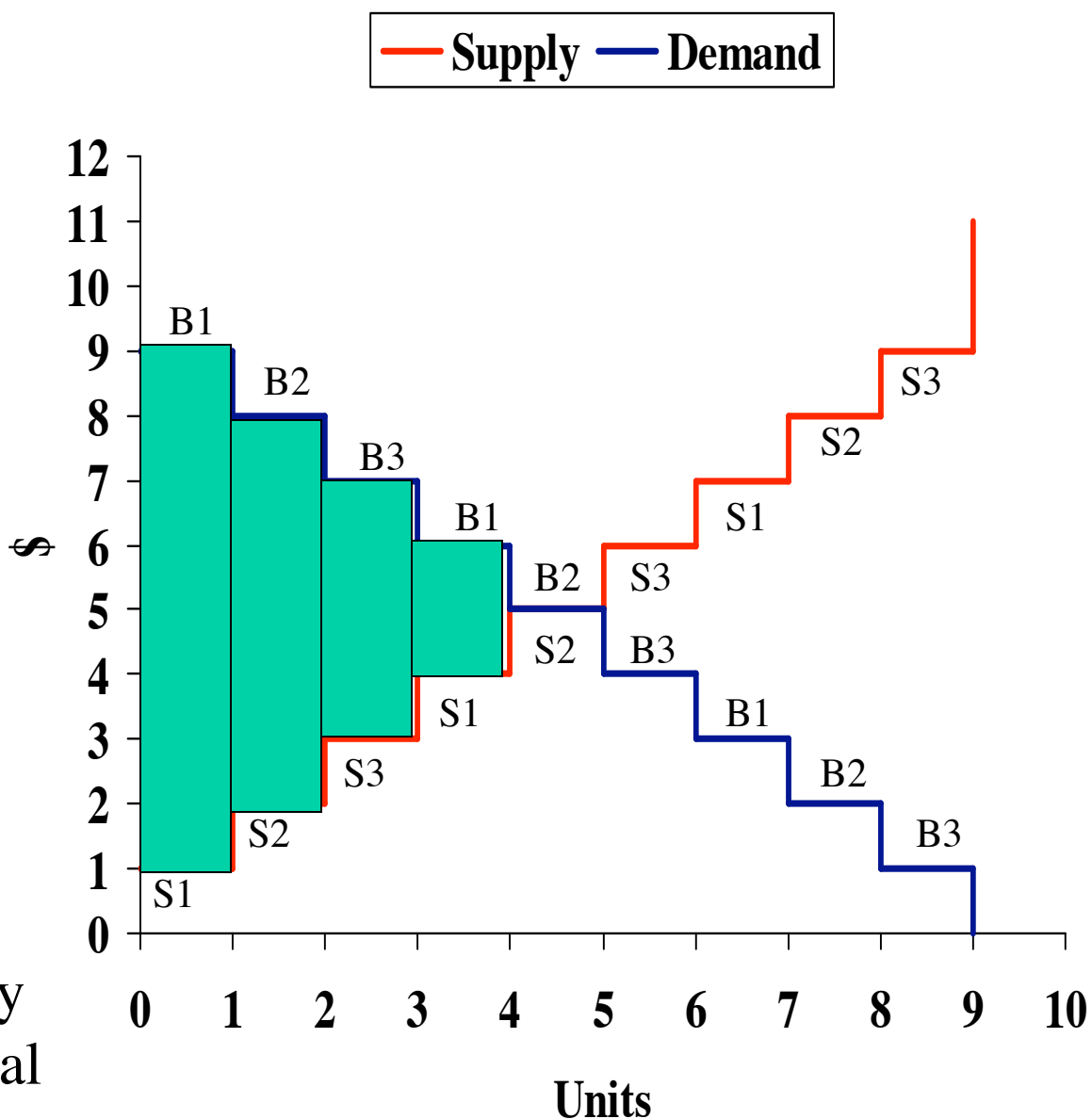
Adding up the green squares we find that total surplus (producer + consumer) is \$20.



The total surplus calculated from the competitive equilibrium is also the maximum possible surplus that can be generated from trade. Can you see why?

For any given set of trades we can calculate the actual surplus generated by those trades.

Market *efficiency* is total surplus realized divided by the maximum possible total surplus.

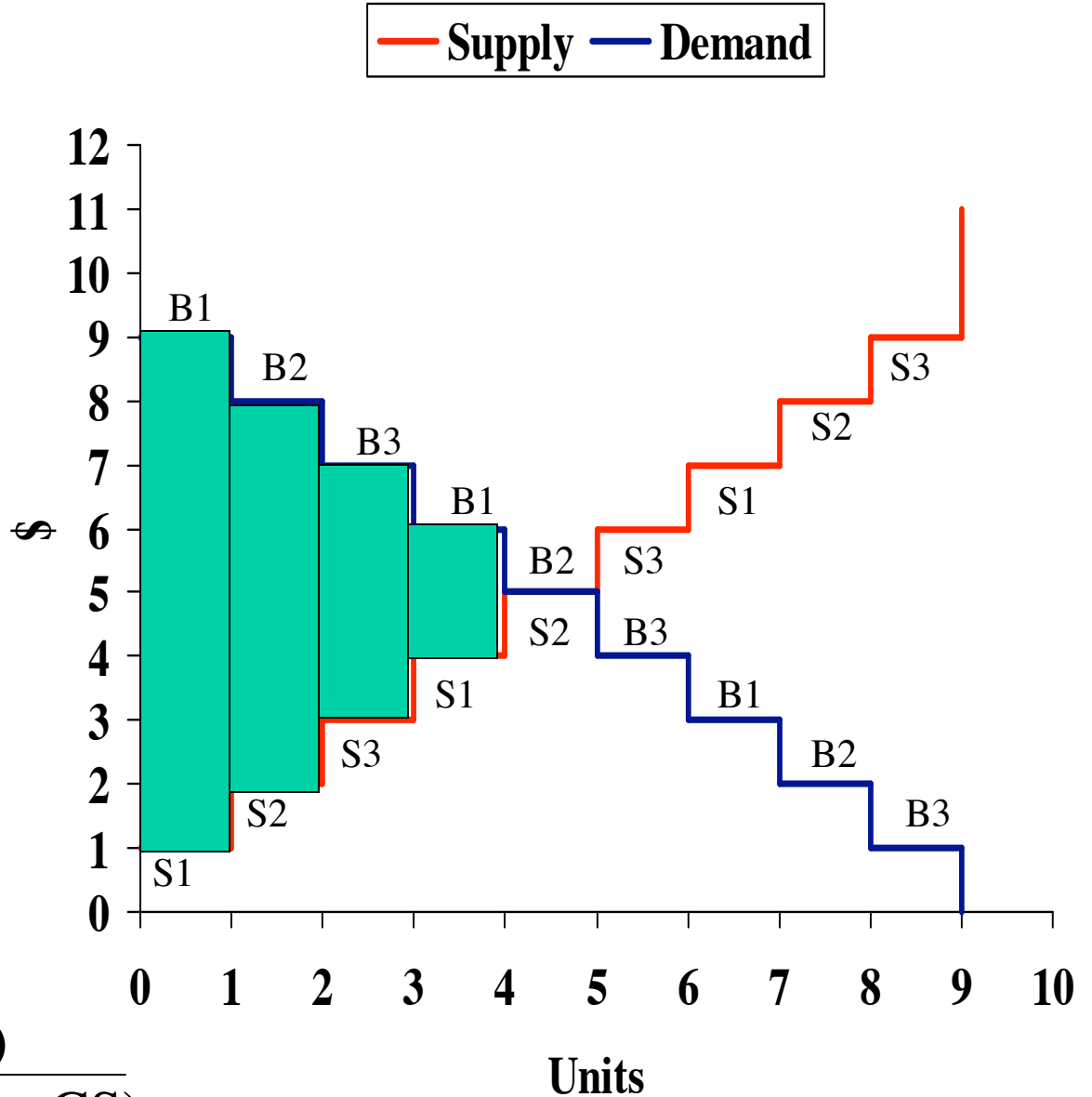


The total surplus calculated from the competitive equilibrium is also the maximum possible surplus that can be generated from trade. Can you see why?

For any given set of trades we can calculate the actual surplus generated by those trades.

Efficiency (%) =

$$\frac{\text{Realized (PS + CS)}}{\text{Maximum Possible (PS + CS)}}$$

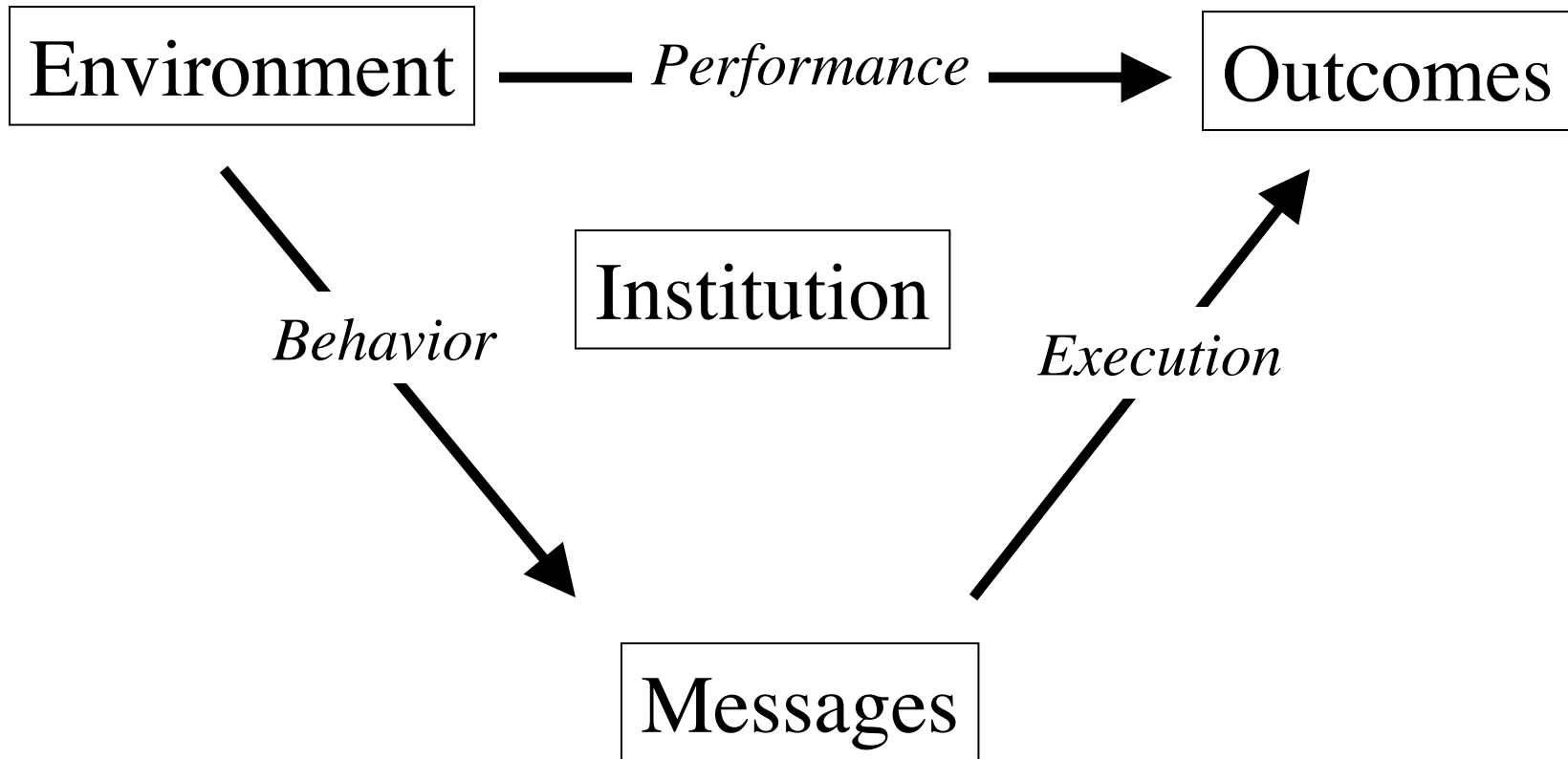


OK...So What Happened in  
Our Market?

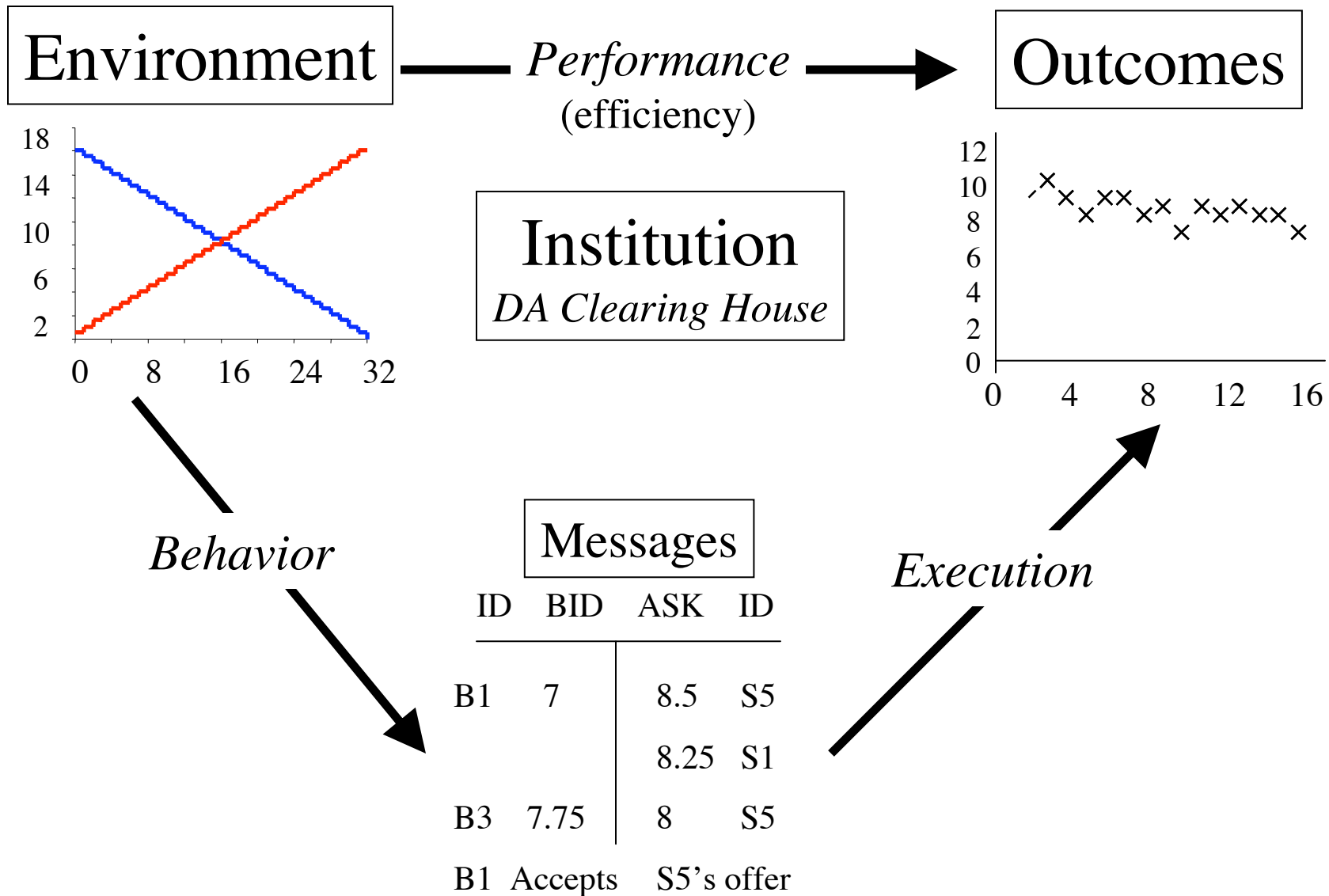
# The Oral Double Auction

- Individuals choose purposefully.
  - Interacting non-cooperatively and impersonally, a market of individuals simultaneously maximizes:
    - (1) An individual's return *intentionally* and
    - (2) The aggregate social gains from exchange *unintentionally*.
      - “an end which was no part of his intention” (Smith, 1776)
- “The most significant fact about this (price) system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action” (Hayek, 1945).

# What is an Economic System?

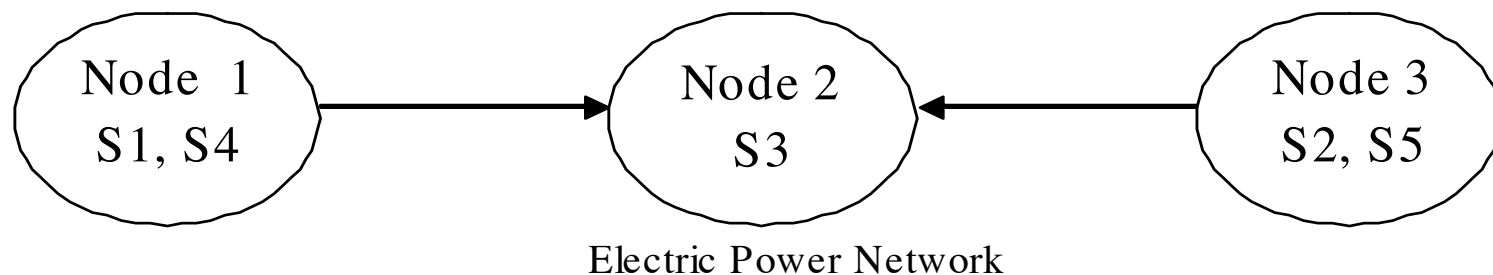


# What is an Economic System?

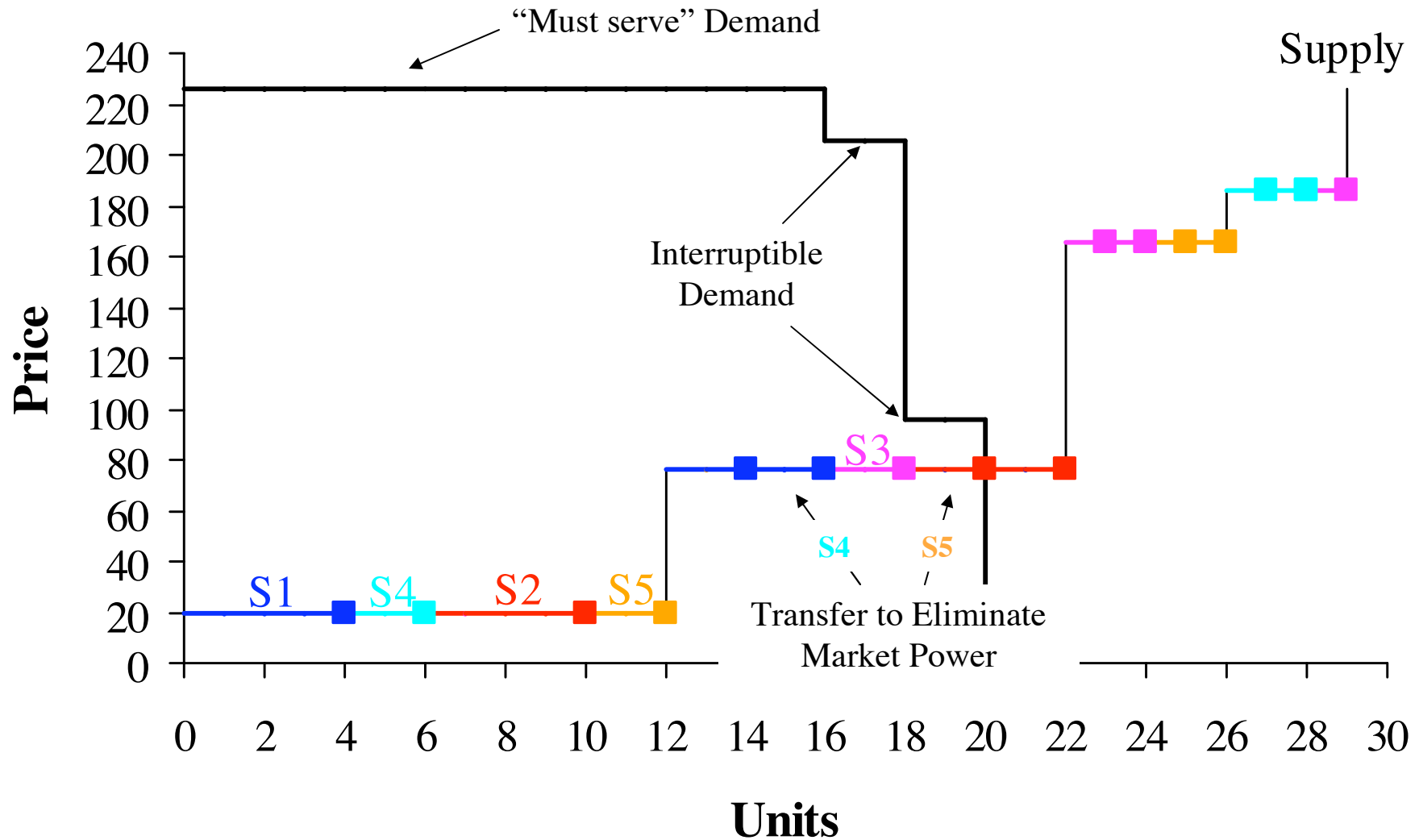


# Experimental Design

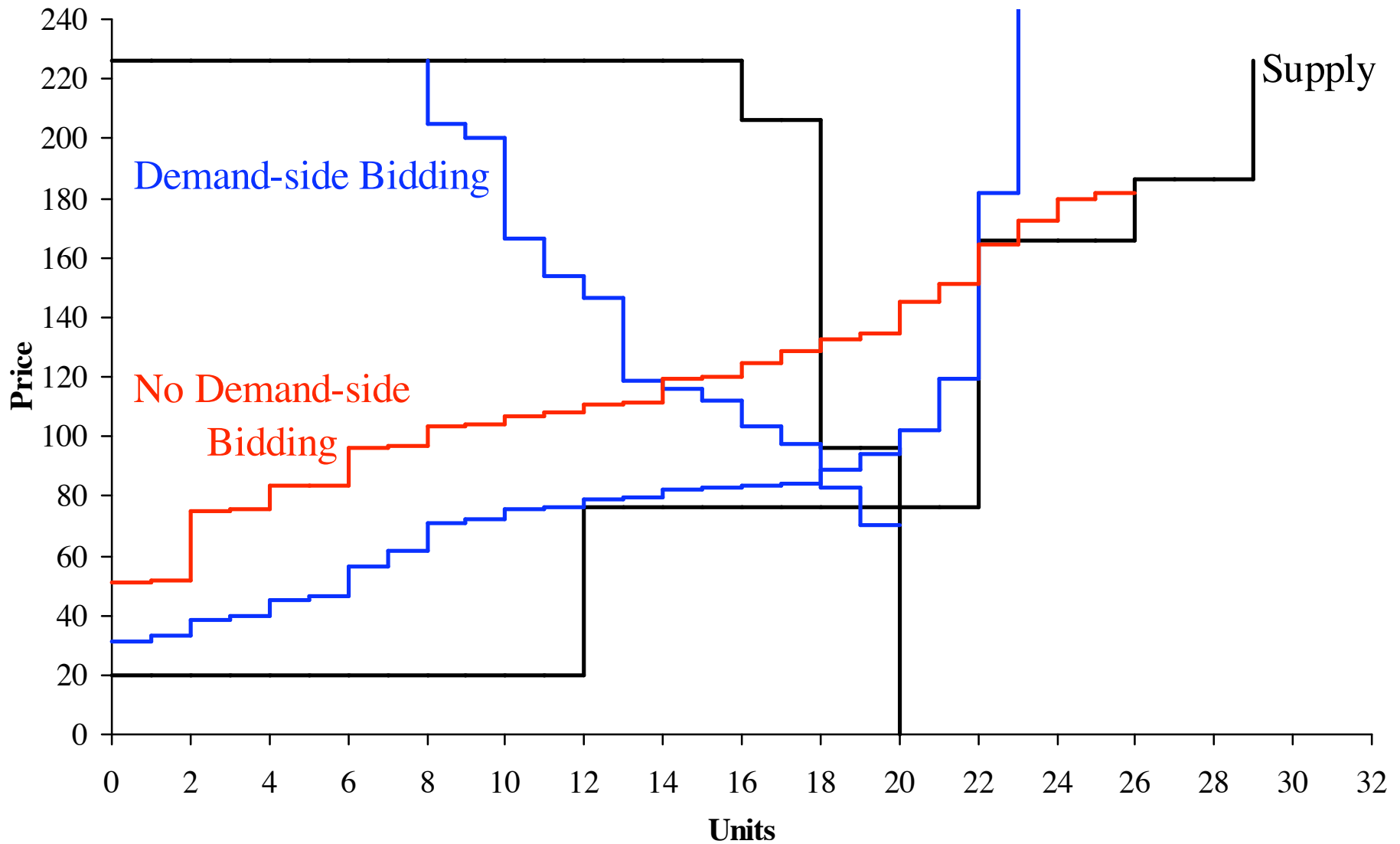
- **Market Power Treatment:**  
*Holding the type, number, and location of generators fixed, we vary the distribution of ownership to introduce market power.*
- **Demand-side Bidding Treatment:**  
*Active wholesale bidding vs. passive (robot) bidding.*
- **Interaction Effect from a  $2 \times 2$  design**



# Market Structure and Design



# Comparison of “Power” Treatments



# Prices in the “Power” Treatments

