Making Predictions with Supply and Demand Curves

February 19, 2010
What are we going to model?

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- Supply is determined by last year’s price (supply)
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Example: Suppose we are selling a product, like computers. The amount in the “market” will determine the price - the more there is, the less people will pay for it. The less there is, the more valuable, and so the prices go up. (This is the usual notion of supply and demand.)
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How much should we produce?

This is based on another assumption, that we will produce an amount related to how much we think we can get for each computer. This, in turn, will depend on how many computers are on the market in a given year.
The Supply and Demand Functions

- Should the demand function be increasing or decreasing (plotting price per unit as a function of quantity)?
The Supply and Demand Functions

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- Decreasing
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- Should the supply function be increasing or decreasing (plotting price per unit as a function of quantity)?
The Supply and Demand Functions

- Should the demand function be increasing or decreasing (plotting price per unit as a function of quantity)?
  - Decreasing

- Should the supply function be increasing or decreasing (plotting price per unit as a function of quantity)?
  - Increasing
Demand Curve

$P$

$Q$

 Demand Curve

$(x; y)$
Supply Curve
Both Curves

Supply Curve

Demand Curve

P

Q

(x; y)
The Big Picture
The Big Picture
The Big Picture
The Big Picture

Supply Curve

Demand Curve

$P$

$p_1$

$p_0$

$q_1$

$q_0$

$q_2$

$Q$
Problems with the Model

We don’t actually know what the supply and demand curves are! We don’t even really know that they exist! If they do, we can try to determine what they are with data.
Assuming the curves exist...

Suppose we have some data:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Computers</th>
<th>Price per computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
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What does this tell us about the demand curve?
We know two points on the demand curve: (100, 500) and (120, 470).
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What does this tell us about the demand curve? We know two points on the demand curve: (100, 500) and (120, 470). Notice that it seems likely that the function is decreasing. What does it tell us about the supply curve?
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What does this tell us about the demand curve? We know two points on the demand curve: (100, 500) and (120, 470). Notice that it seems likely that the function is decreasing. What does it tell us about the supply curve? Only that (120, 500) is on the curve. We need more to determine the curve.
## The Supply Curve

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We now have \((120, 500)\) and \((110, 470)\).
How can we represent this graphically?
One Possible Picture
For your assignment...

Use data to determine possible supply and demand curves (they will be linear).
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Make predictions based on these functions.
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Make predictions based on these functions.
Interpret, and analyze the model.
A little more of an example

Suppose we did some computations on data and determined some supply and demand functions:

\[ D(Q) = 100 - 2Q \]
\[ S(Q) = (0.3Q)^2 \]

We begin by producing 10 units. Now what?
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\[ D(10) = 80, \text{ so we sell each unit for } $80 \text{ a piece. Now what?} \]
A little more of an example

Suppose we did some computations on data and determined some supply and demand functions:

\[
D(Q) = 100 - 2Q \\
S(Q) = (.3Q)^2
\]

We begin by producing 10 units. Now what? \(D(10) = 80\), so we sell each unit for $80 a piece. Now what? Last year we sold units for $80 a piece, so we supply according to that rule: \(P = S(Q) = (.3Q)^2\), where \(P = 80\), so \(80 = (.3Q)^2\), so \(Q\) is roughly 29.81, which we’ll round to 30 units. (You can round at each stage and use the rounded number or keep the decimals. Think about what effect this will have).
Example Continued

Now we’ve produced 30 units, so since
\[ D(30) = 100 - 2 \times 30 = 40, \]
they will end up being sold for $40 a piece. (We’ve flooded the market.)
Example Continued

Now we’ve produced 30 units, so since $D(30) = 100 - 2 \times 30 = 40$, they will end up being sold for $40$ a piece. (We’ve flooded the market.) Now next year we will know that the price per unit last year was $40$ a piece, so we will produce according to $40 = P = S(Q) = (.3Q)^2$, so $Q = 21.08$, so we produce 21 units.
One Possible Picture
One Possible Picture

(10, 80)
One Possible Picture

(10,80)

(29.81,80)
One Possible Picture
One Possible Picture
One Possible Picture
One Possible Picture
Questions?