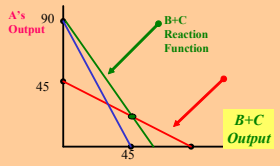
Extending the Cournot Model



Our Example

$$Q = 100 - 2p$$

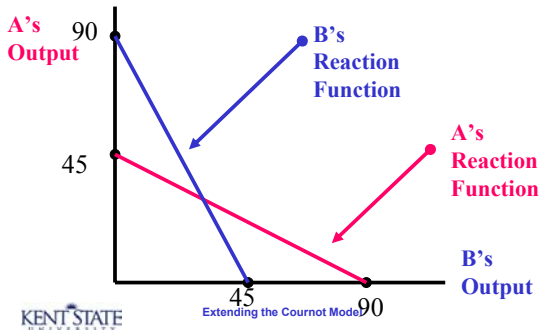
$$MC=5$$

The Reaction Function

$$q_A = 45 - (1/2)q_B$$

$$q_B = 45 - (1/2)q_A$$

Graphing the Reaction Function



New Assumptions

- Three firms, A, B, C

$$Q = 100 - 2p$$

$$MC=5$$

The Reaction Function

$$q_A = 45 - (1/2)(q_B+q_C)$$

$$q_B = 45 - (1/2)(q_A+q_C)$$

The Reaction Function

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The Reaction Function

$$q_A = 45 - (1/2)(q_B + q_C)$$
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$$q_A = 22.5$$
$$q_A + q_B + q_C = 67.5$$

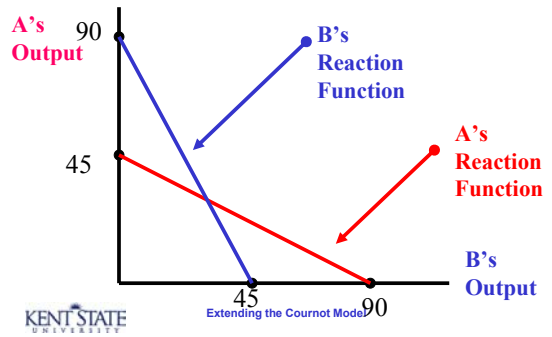
The Reaction Function

$$67.5 = \frac{3}{4}90$$

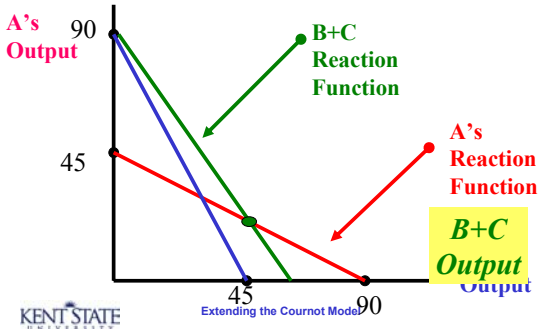
$$q_A = 22.5$$
$$q_A + q_B + q_C =$$

$$Q_1 = \frac{1}{2}Q_c$$
$$Q_2 = \frac{2}{3}Q_c$$
$$Q_3 = \frac{3}{4}Q_c$$

Graphing the Reaction Function



With Three Firms



The Pattern

- With n firms, output is a fraction

$$\frac{n}{n+1}$$

of the amount demanded in perfect competition

The Wudget Problem

- To Review

$$Q = 630{,}000 - 300\,p$$

The Wudget Problem

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$$Q = 630{,}000 - 300\,p$$

$$MC = \$500$$

- A monopoly maximizes profits by selling 240,000 units at a price of $1300.
- Let's call this year zero.

The Wudget Problem

If MC = $400 in year one, the monopoly maximizes profits with P= $1250 and Q= 255,000

000 – 300 p

= $500

izes profits by selling

ice of $1300

The Wudget Problem

- Now suppose that in year two a second firm starts making the wudget. MC = $400.

The Wudget Problem

- Now suppose that in the second year a second firm starts making the wudget. MC = $400.

$$Q_C = 640{,}000 - 300\,(400) = 630{,}000\text{-}120{,}000 = 510{,}000$$

The Wudget Problem

- Now suppose that in the second year a second firm starts making the wudget. MC = $400.

$$Q_C = 630{,}000 - 300\,(400) = 630{,}000\text{-}120{,}000 = 510{,}000$$

$$Q = (2/3)510{,}000 = 340{,}000$$

$$P = \$967$$

Year Three Sales

- A third firm starts making the Wudget. MC =$400.

Year Three Sales and Price

$$Q_C = 510{,}000$$

Year Three Sales and Price

$$Q_C = 510{,}000$$

$$Q=(3/4)510{,}000=382{,}500$$

$$q = 127{,}500$$

Year Three Sales and Price

$$Q_C = 510{,}000$$

$$Q=(3/4)510{,}000=382{,}500$$

$$q = 127{,}500$$

$$P = (630{,}000\text{-}382{,}500)/300 = \$825$$

Years Four and Five

- A new firm enters each year

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  Q = 408,000, q = 102,000, P = $740

Years Four and Five

- A new firm enters each year.
- Without going through the algebra…
- **Year Four:**

  Q = 408,000, q = 102,000, P = $740
- ***Year Five:***

  Q = 425,000, q = 85,000, P = $683

Year by Year Summary

Year	Price	Quantity
0	$1300	240,000
1	$1250	255,000
2	$967	340,000
3	$825	382,500
4	$740	408,000
5	$683	425,000

Year by Year Summary

Year	Price	Quantity
0	***$1300***	240,000
1	***$1250***	255,000
2	***$967***	340,000
3	***$825***	382,500
4	***$740***	408,000
5	***$683***	425,000

Conclusion

- As the number of firms grows,

$$P \rightarrow MC$$

- The Cournot model gives us a series of predictions about how that will occur.

The Appeal of the Cournot Model

- With two firms, why not simply try the cooperative solution.
- With five firms…

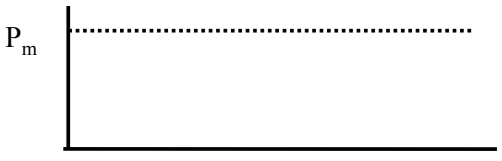
How Many Economists does it take…?

- In fact we know the world is not as simple as the Cournot model
- So, how many firms does it take to get to the competitive price?

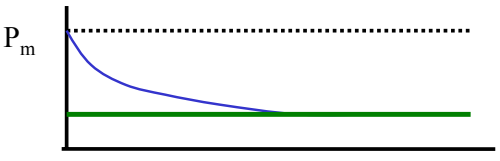
How Many Economists does it take…?

- Leonard Wiess Studied the process

How Many Economists does it take…?



How Many Economists does it take…?



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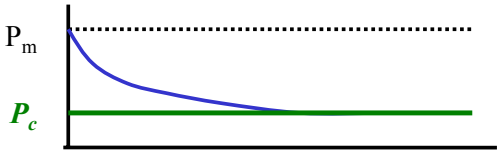
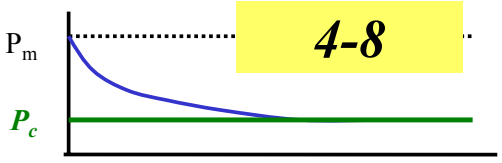
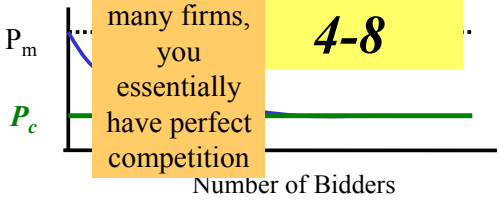


How Many Economists does it take…?



How Many Economists does it take…?

With that many firms, you essentially have perfect competition



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