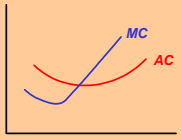
Marginal and Average Cost



A Cost Function

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11		
1	14		
2	24		
3	36		
4	52		
5	75		

Average Cost

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11		
1	14		
2	24	12	
3	36		
4	52		
5	75		

Average Cost

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11	NA	
1	14	14	
2	24	12	
3	36	12	
4	52	13	
5	75	15	

Marginal Cost

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11	NA	
1	14	14	
2	24	12	10
3	36	12	
4	52	13	
5	75	15	

Marginal Cost

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11	NA	
1	14	14	3
2	24	12	10
3	36	12	12
4	52	13	16
5	75	15	23

A Key Proposition

- If MC < AC, AC is falling

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- If MC < AC, AC is falling
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A Key Proposition

- If MC < AC, AC is falling
- If MC = AC, AC is constant
- If MC > AC, AC is rising
- Intuitively, the only way AC can be rising is if the incremental units cost more than the average.

The Proposition Illustrated

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11	NA	
1	14	14	3
2	24	12	10
3	36	12	12
4	52	13	16
5	75	15	23

MC<AC; AC Falling

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11	NA	
1	14	14	3
2	24	12	10
3	36	12	12
4	52	13	16
5	75	15	23

MC>AC; AC Rising

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11	NA	
1	14	14	3
2	24	12	10
3	36	12	12
4	52	13	16
5	75	15	23

MC=AC; AC Constant

Quantity	Total Cost	Average Cost	Incremental Cost or Marginal Cost
0	11	NA	
1	14	14	3
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3	36	12	12
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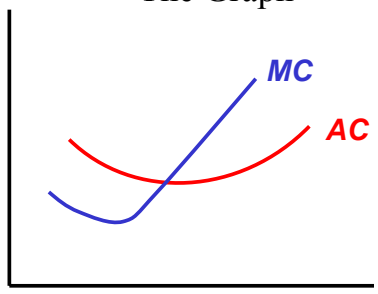
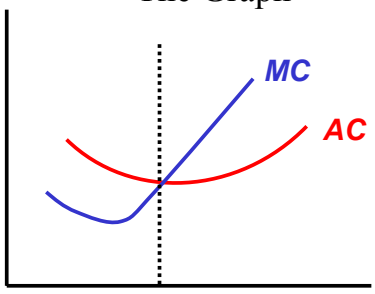
The Graph



The Graph



The Mathematics

$$AC = \frac{C(q)}{q}$$

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$$\frac{dAC}{dq} = \frac{dC}{dq}\left(\frac{1}{q}\right) - C(q)\left(\frac{1}{q^2}\right)$$

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$$\frac{dAC}{dQ} = \left(\frac{1}{q}\right)\left(\frac{dC}{dq} - \frac{C(q)}{q}\right)$$

The Mathematics

$$\frac{dAC}{dQ} = \left(\frac{1}{q}\right)\left(\frac{dC}{dq} - \frac{C(q)}{q}\right)$$

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$$\frac{dAC}{dQ} = \left(\frac{1}{q}\right)\left(\frac{dC}{dq} - \frac{C(q)}{q}\right)$$

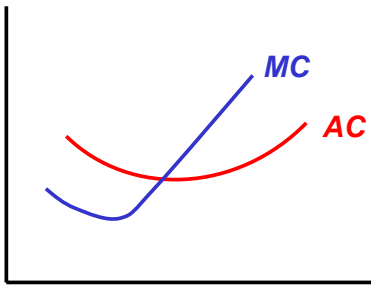
$$\frac{dAC}{dQ} = \left(\frac{1}{q}\right)(MC - AC)$$

The Mathematics

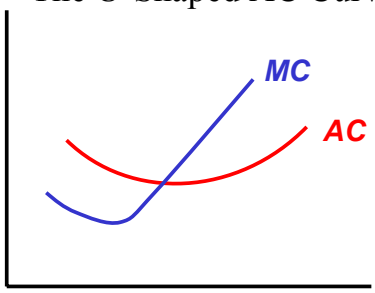
$$\frac{dAC}{dQ} = \left(\frac{1}{q}\right)(MC - AC)$$

If MC > AC, AC is rising;
MC < AC, AC is falling

The General Relation



The U-Shaped AC Curve



The U-Shaped AC Curve

This is an empirical statement, not a general requirement
Lets defer the question of why this relation until later.

End