Economics 001
Principles of Microeconomics

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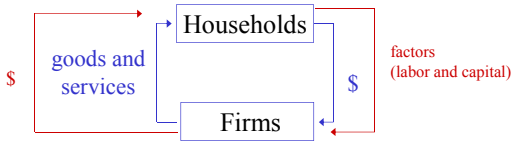
•Lecture 12
- Firms
- cost in the short-run

A diagram of the economy



Firms

Three economic supply decisions:

1) Whether to produce?
2) How much to produce?
3) How to produce?

Firms

Assume profit maximization . . .

$\pi = P \times Q - TC$

Inputs = factors of production
Outputs = products

Costs

- (a) purchased and rented factors
- (b) imputed costs (opportunity costs)
  - using own time
  - firms' own equity
  - durable assets

Consider an unskilled worker who can earn $20,000 per year in any of many plentiful jobs: working in a factory, being a construction laborer, doing childcare, etc. She is thinking of operating an ice cream cart on The Mall in Washington DC. She has done some investigating, and knows the following.

- A used cart costs $8000.
- The cart will sell one year later for about $7000.
- She has $4000 in the bank, earning 5% interest, which she can invest in the cart.
- If she borrows the rest of the money for the cart, the bank will charge her 10%.
- One year's worth of ice cream will cost her $30,000. She does not need to borrow the money for this because Häagen-Dazs will give her the ice cream weekly in advance of her sales.
- She can sell that ice cream for $52,000.

What is her total net profit of operating the ice cream cart for one year (taking into account all opportunity costs)?

Production and costs in the short run

- DN: Short run = time period in which some factors are fixed
  - fixed factors hard to change
  - fixed factors do not depend on output (Q)
- TC = TFC + TVC

Costs

- AC = TC/Q
- AFC = TFC/Q
- AVC = TVC/Q
- MC = ΔTC/ Δ Q = Δ TVC/ Δ Q
- MR = Δ TR/ Δ Q = P× Δ Q/ΔQ = P

(for now)

Two parts of the short-run production decision

- (1) produce at all ?
  - TR>TVC
  - implies π can be negative in the SR
- (2) how much ?

Example: A pizza business

- rent = $100 /day (fixed costs)
- P = $10 each
- AVC = $5 per pizza
- Sundays slow -- only sell 10 pizzas

Sunday production decision

- TR = 10 × $10 = $100
- TVC = 10 × $5 = $50
- TC = $100 + $50 = $150
- π = TR – TC = $100 – $150 = –$50

Profits if open: π = -$50

Profits if closed: π = -$100

Shutdown price (rule #1)

- Stay open if TR > TVC
- P×Q > TVC
- P > TVC/Q = AVC
- P > AVC

Costs

- AC = TC/Q
- AFC = TFC/Q
- AVC = TVC/Q
- MC = ΔTC/ Δ Q = Δ TVC/ Δ Q
- MR = Δ TR/ Δ Q = P× Δ Q/ΔQ = P

(for now)

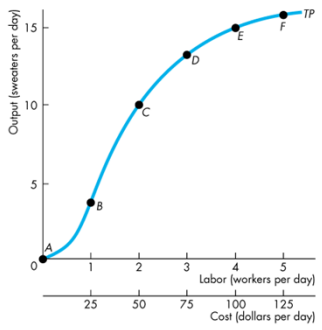
Example: A sweater factory (wage = $25/day)

TFC	L	Q	TVC	TC	AFC	AVC	ATC	MC
25	0	0						
25	1	4						
25	2	10						
25	3	13						
25	4	15						
25	5	16						

Example: A sweater factory (wage = $25/day)

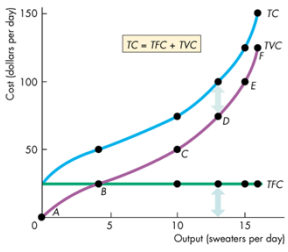
TFC	L	Q	TVC	TC	AFC	AVC	ATC	MC
25	0	0	0	25	--	--	--	
25	1	4	25	50	6.25	6.25	12.5	} 6.25
25	2	10	50	75	2.50	5.00	7.50	} 4.17
25	3	13	75	100	1.92	5.77	7.69	} 8.33
25	4	15	100	125	1.67	6.67	8.33	} 12.50
25	5	16	125	150	1.56	7.81	9.38	} 25.00

Relationship Between Total Product and Total Cost

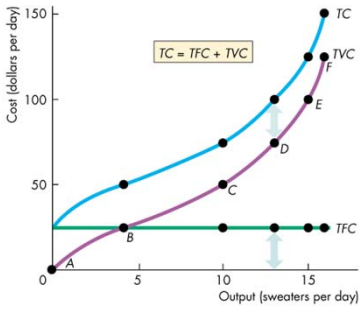


Short-Run Cost

- Redraw the graph with cost on the *y*-axis and output on the *x*-axis, and you've got the *TVC* curve drawn the usual way.
- Put the *TFC* curve back in the figure,
- and add *TFC* to *TVC*, and you've got the *TC* curve.



Short-Run Cost



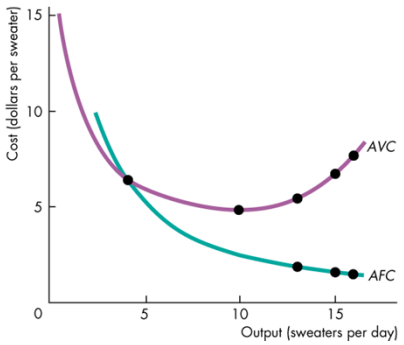
Short-Run Cost

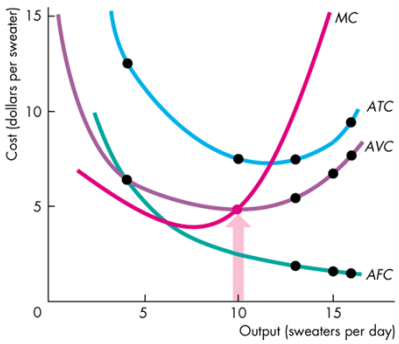
- Marginal Cost
  - **Marginal cost** *(MC)* is the increase in total cost that results from a one-unit increase in total product.
  - Over the output range with *increasing marginal returns*, marginal cost falls as output increases.
  - Over the output range with *diminishing marginal returns*, marginal cost rises as output increases.

Short-Run Cost

- Average Cost
  - Average cost measures can be derived from each of the total cost measures:
  - **Average fixed cost** *(AFC)* is total fixed cost per unit of output.
  - **Average variable cost** *(AVC)* is total variable cost per unit of output.
  - **Average total cost** *(ATC)* is total cost per unit of output.
  - ***ATC = AFC + AVC.***

Short-Run Cost





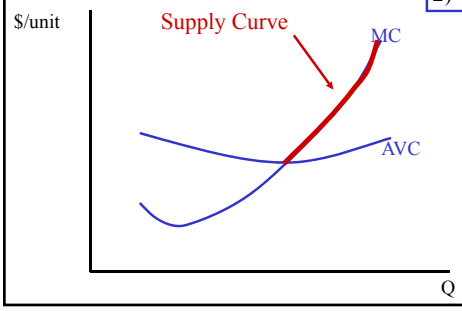
Part 2 of the production decision

- marginal analysis
- cost of additional sweater = MC = ΔTC/ Δ Q
- benefit of additional sweater = P = MR
- .....
  - if MR>MC produce another sweater
  - if MR<MC produce fewer sweaters

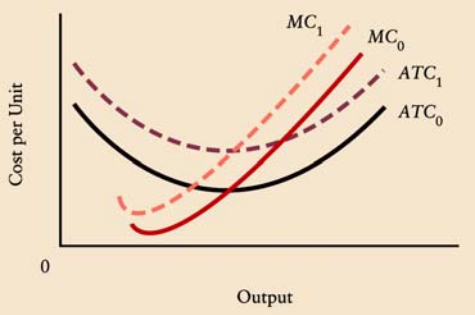
Rule #2: Increase production until MR=MC

The two production decisions...

1) P>AVC
2) MC=MR=P

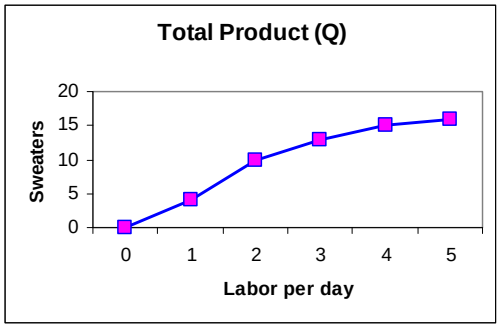


The Effect of a Change in Input Prices

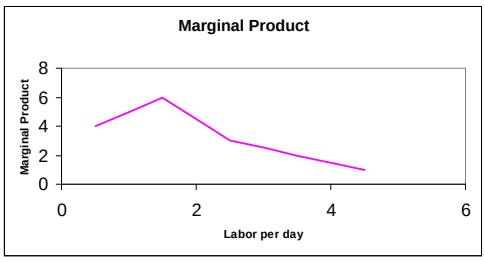


Another view of Production Costs ….

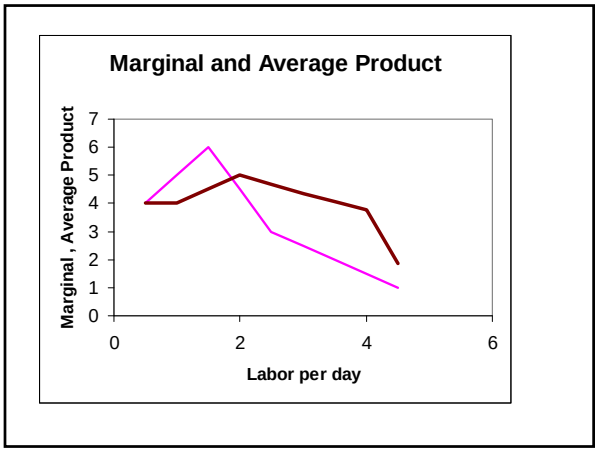
	Sweater Company	
	Units of labor per day	Sweaters per day
		Total Product
A	0	0
B	1	4
C	2	10
D	3	13
E	4	15
F	5	16

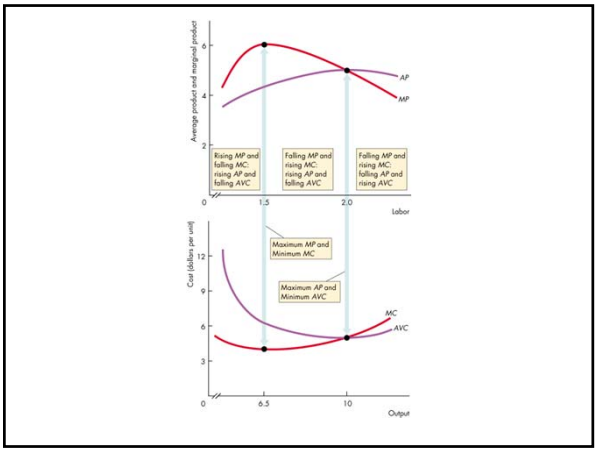


	Sweater Company		
	Units of labor per day	Sweaters per day	
		Total Product	Marginal Product
A	0	0	4
B	1	4	6
C	2	10	3
D	3	13	2
E	4	15	1
F	5	16	



	Sweater Company			
	Units of labor per day	Jackets per day		
		Total Product	Marginal Product	Average Product
A	0	0	4	
B	1	4	6	4.00
C	2	10	3	5.00
D	3	13	2	4.33
E	4	15	1	3.75


Marginal and Average Product
Marginal , Average Product
0
1
2
3
4
5
6
7
0
2
4
6
Labor per day


AP
MP
Rising MP and falling MC; rising AP and falling AVC
Falling MP and rising MC; rising AP and falling AVC
Falling MP and rising MC; falling AP and rising AVC
1.5
2.0
Labor
Maximum MP and Minimum MC
Maximum AP and Minimum AVC
MC
AVC
6.5
10
Output