

공급(I)

경제원론1

조남운

Outline

- 생산함수
- 수익체감
- 한계비용, 평균비용(MC, AC)
- 장기와 단기
- 규모의 경제

생산함수

Production function

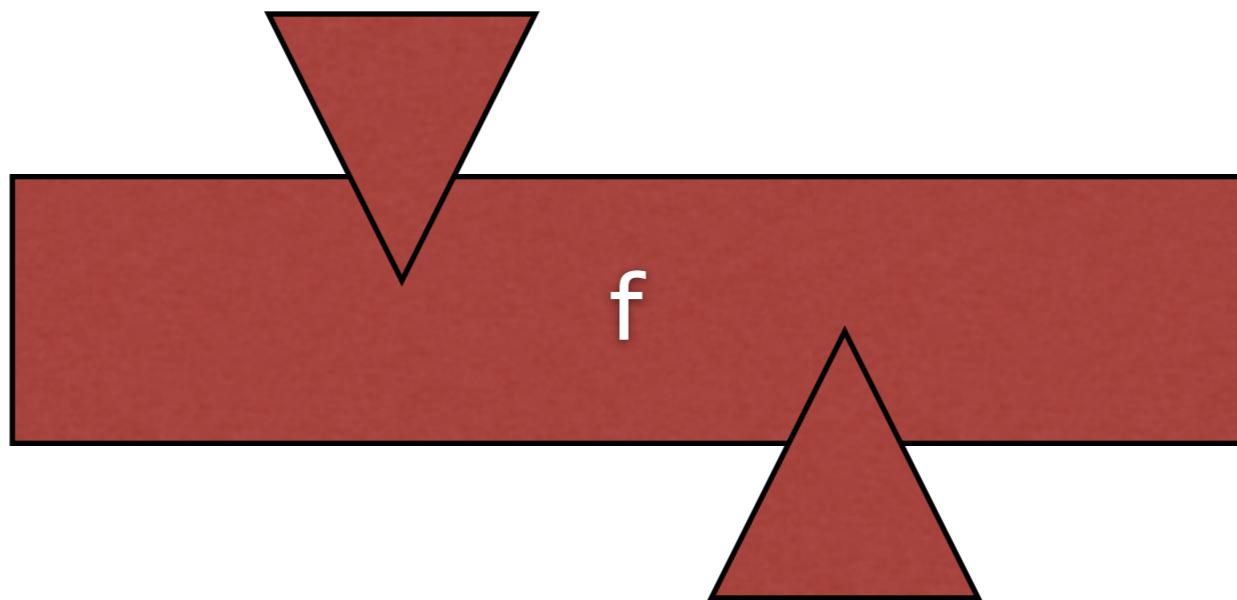
함수

Function

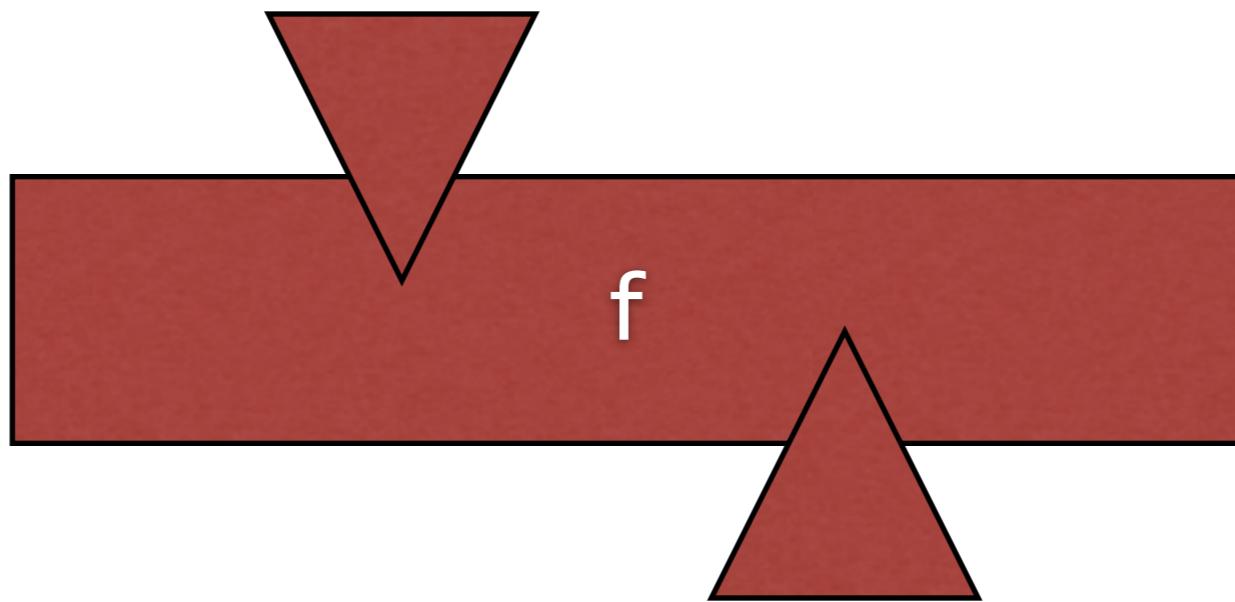
- 독립변수와 종속변수의 관계를 표현한 것

$$f(x) = ax + b$$

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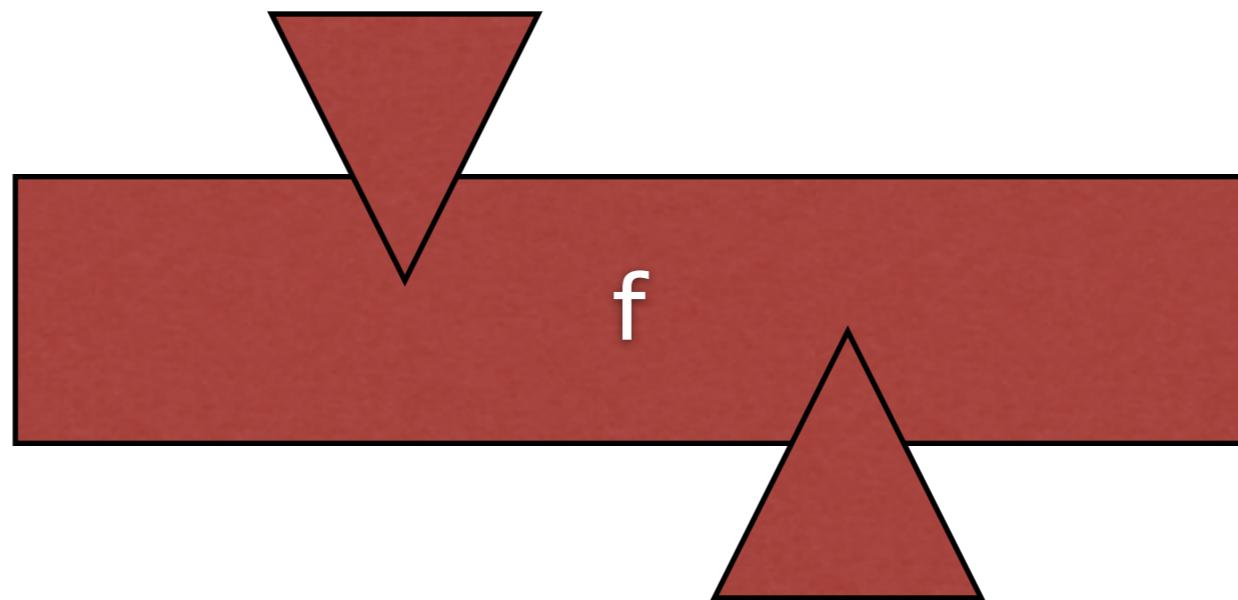


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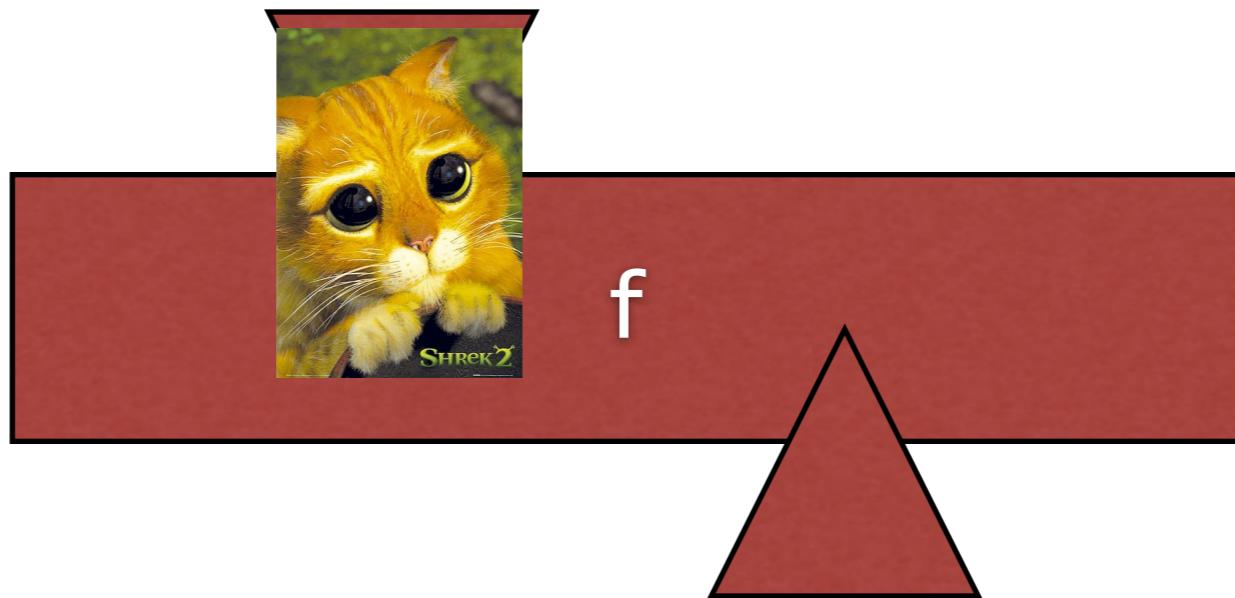


$$ax+b$$

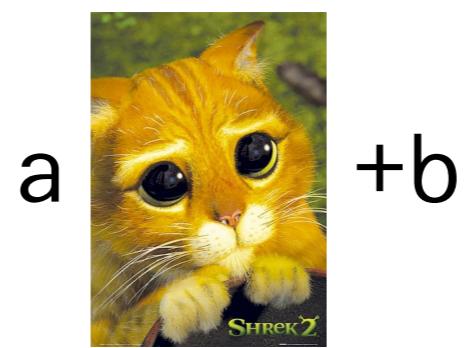
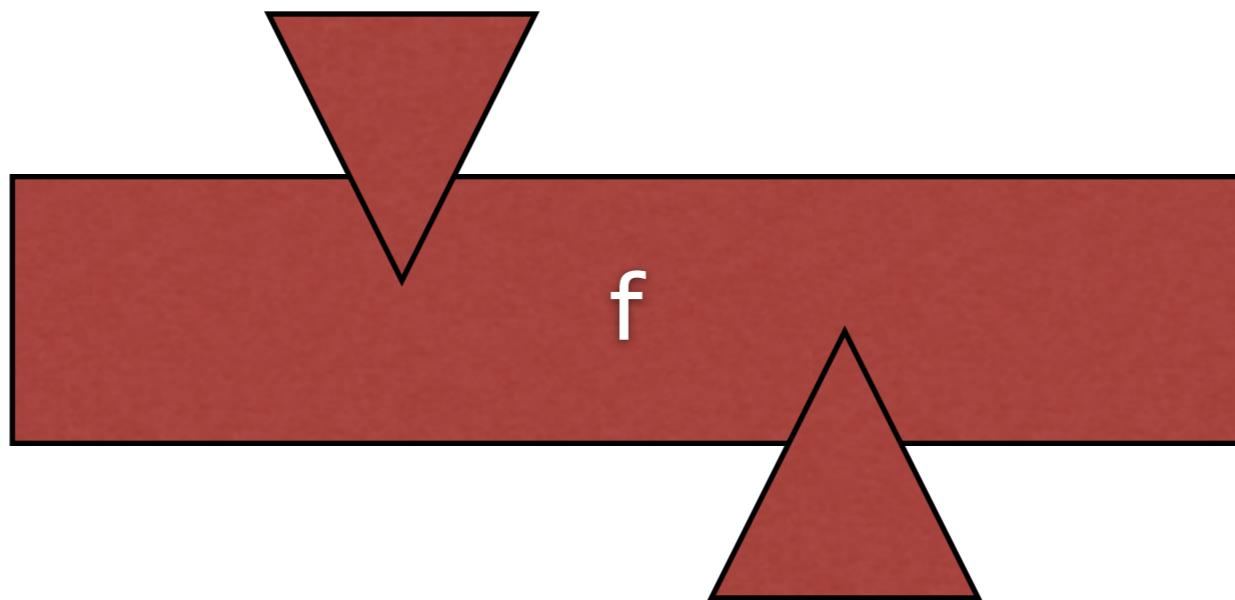
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y=f(x)

함수이름



$$y=f(x)$$

함수이름



$$y=f(x)$$



독립변수(인자)
independent variable,
input, argument

함수이름

$$y=f(x)$$

종속변수

dependent variable,
output

독립변수(인자)

independent variable,
input, argument

함수의 변수

- $f(a) = ax+b$
 - $f(3) = ?$
- $g(a,b) = ax+b$
 - $g=f?$

$$f(x) \;\; = ax^2 + 4y + b$$

$$f(x,y)=ax^2+4y+b$$

$$h(a,b)=aa^2+4b+b$$

$$j(s,t)=s^3+5t$$

$$i(y,x)=ay^2+4x+b$$

$$g(Tom,Jerry)=aJerry^2+4Tom+b$$

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다음 중 같은 함수는?

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생산함수란?

- 독립변수를 투입물의 양으로, 종속변수를 산출물의 양으로 상정하였을 때 두 변수간의 양적 관계를 함수식으로 표현한 것
- [산출물의 양] = $f(\text{투입물의 양})$
- 투입물과 산출물간의 양적 관계를 함수로 나타낸 것

Ex. 쌀농사의 경우

- 투입요소(생산요소): 토지, 농기계, 노동
- 토지/기계(고정량: 토지10ha, 5대의 경운기)와 노동(명)을 투입하여 쌀을 산출: 지대/경운기임대료: 각각 400만원, 임금: 200만원
- 생산함수를 f 라고 하면:
- [쌀의 양] = $f(\text{토지면적}, \text{자본량}, \text{노동량})$

고정투입, 가변투입

Fixed input, Variable input

- Fixed input: 투입량이 고정되어 단기에 변경할 수 없는 투입물 -- 토지, 농기계 등
- Variable input: 단기에 투입량을 변경할 수 있는 투입물 -- 노동량

장기와 단기

Long-run and Short-run

- 고정요소라 할지라도 충분히 긴 시간(장기)의 관점에서는 투입량을 조절할 수 있음
- 즉, 장기에는 모든 요소가 가변적
- 단기: 가변투입요소만이 변수(고정투입요소: 상수)
 - $Q=f(L)$
- 장기: 가변, 고정투입요소 모두 변수
 - $Q=F(L, \text{토지량}, \text{자본량})$

Ex: 어떤 산업(쌀농사)의 투입량과 산출량

L(명)	Q(단위)
0	0
1	19
2	36
3	51
4	64
5	75
6	84
7	91
8	96

총생산곡선 도출

TPC: Total Product Curve

총생산곡선 도출

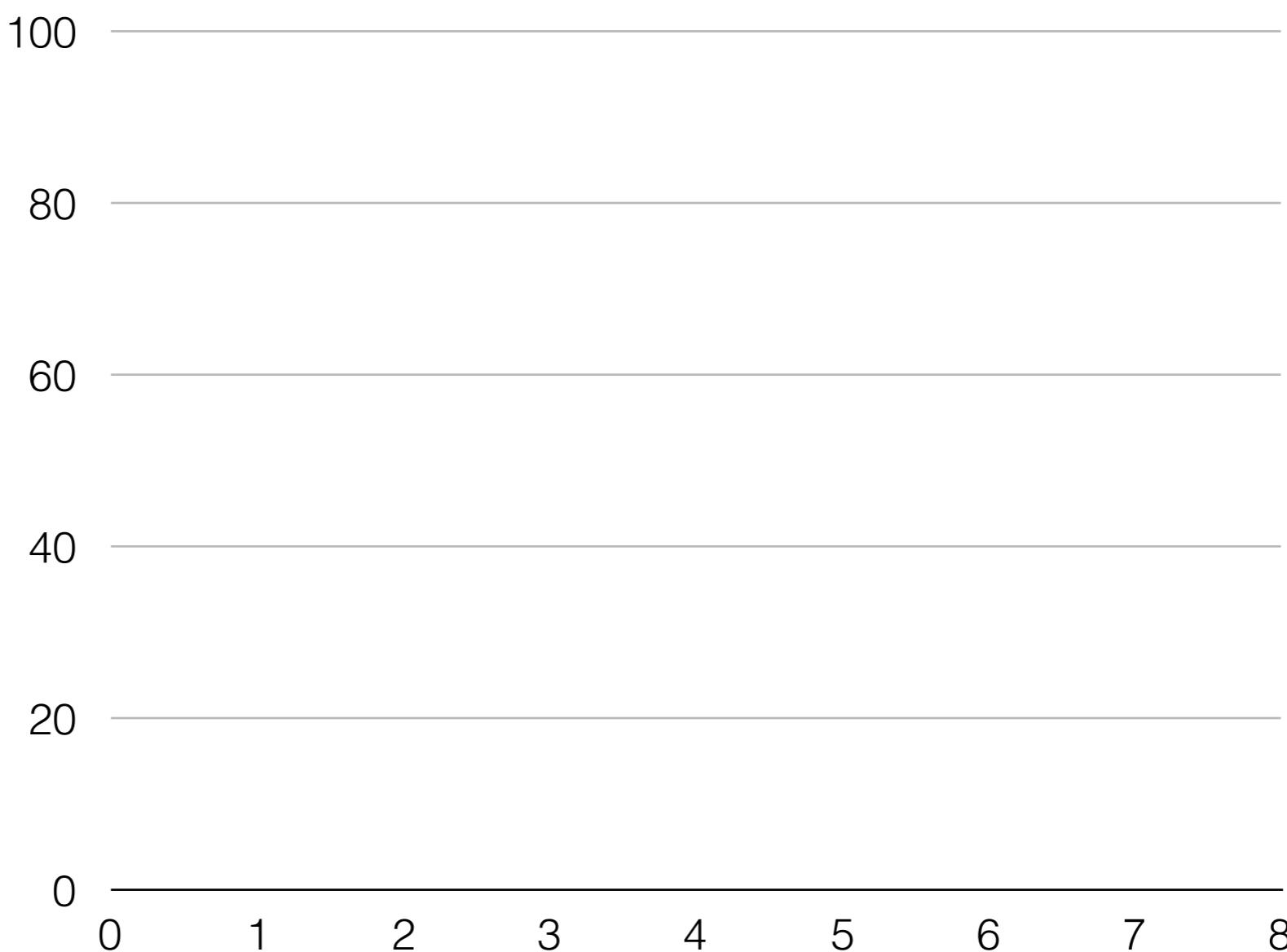
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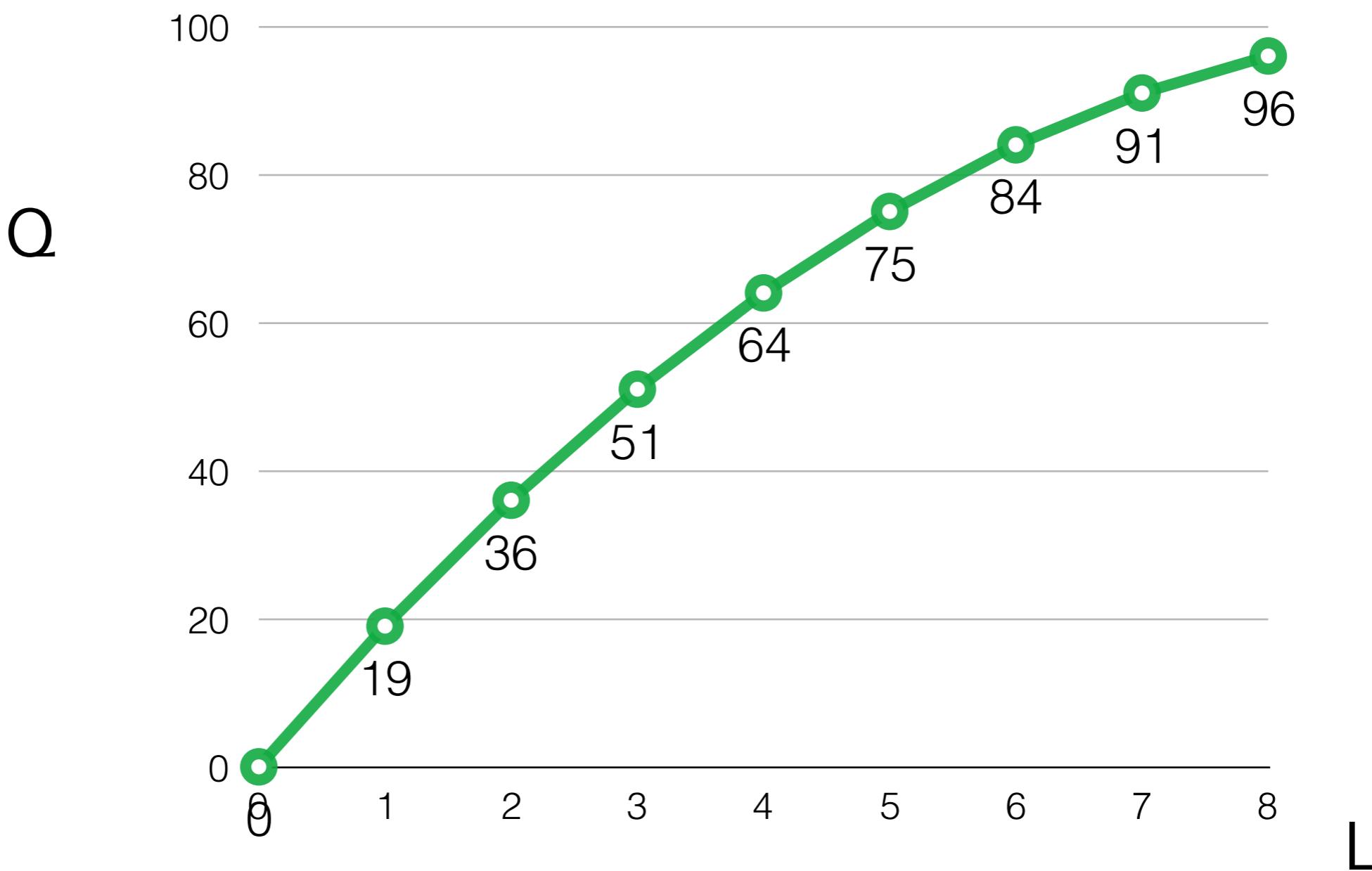
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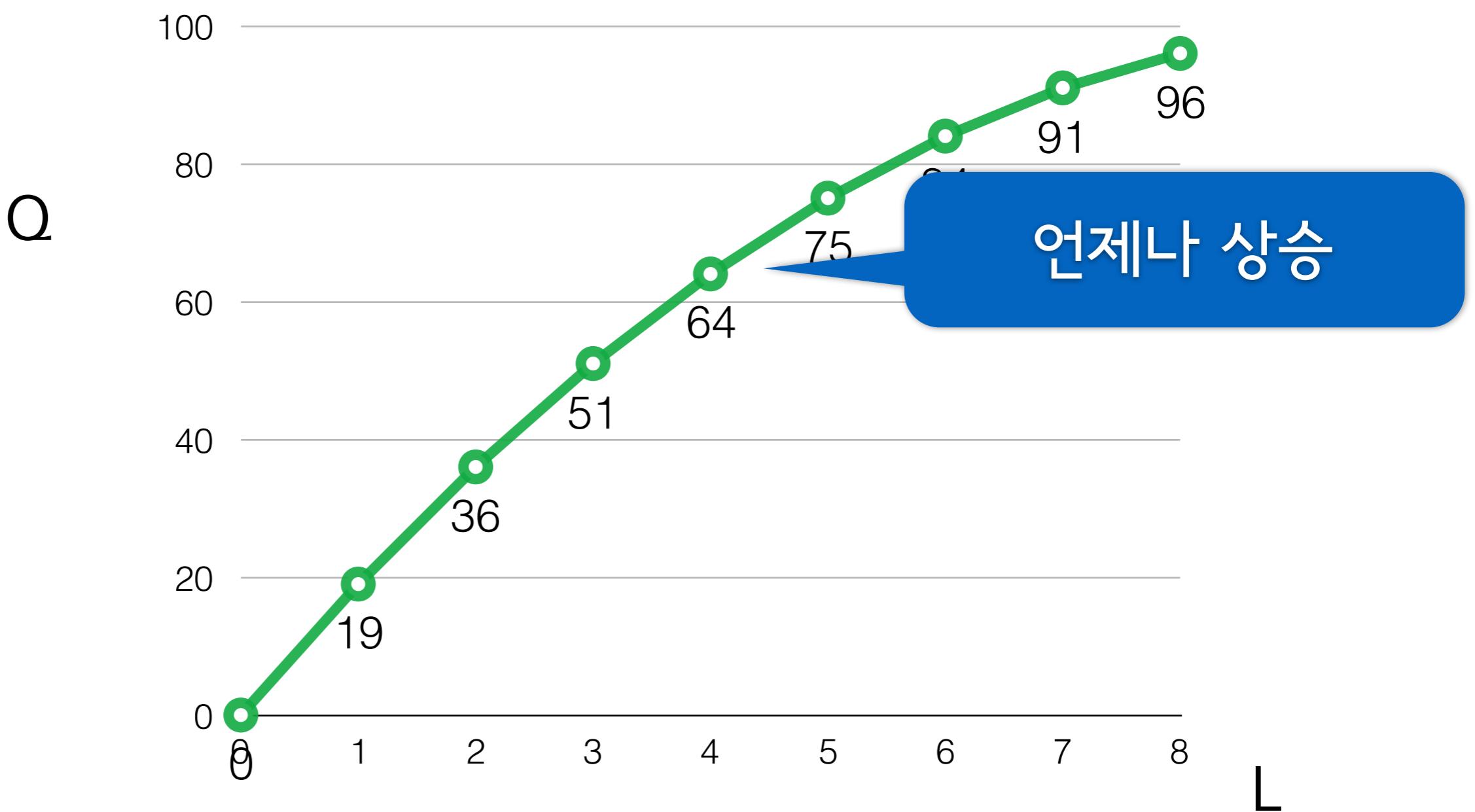
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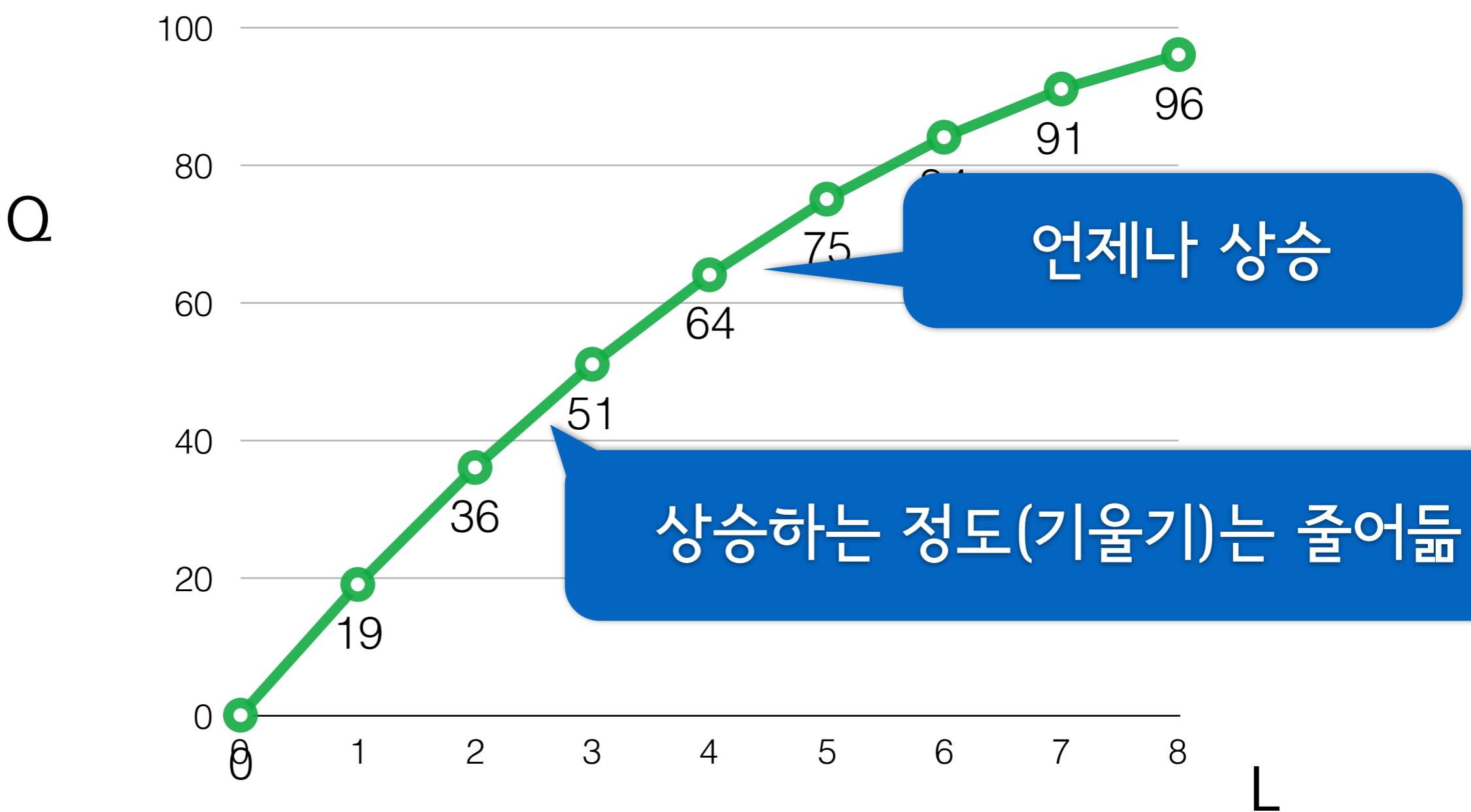
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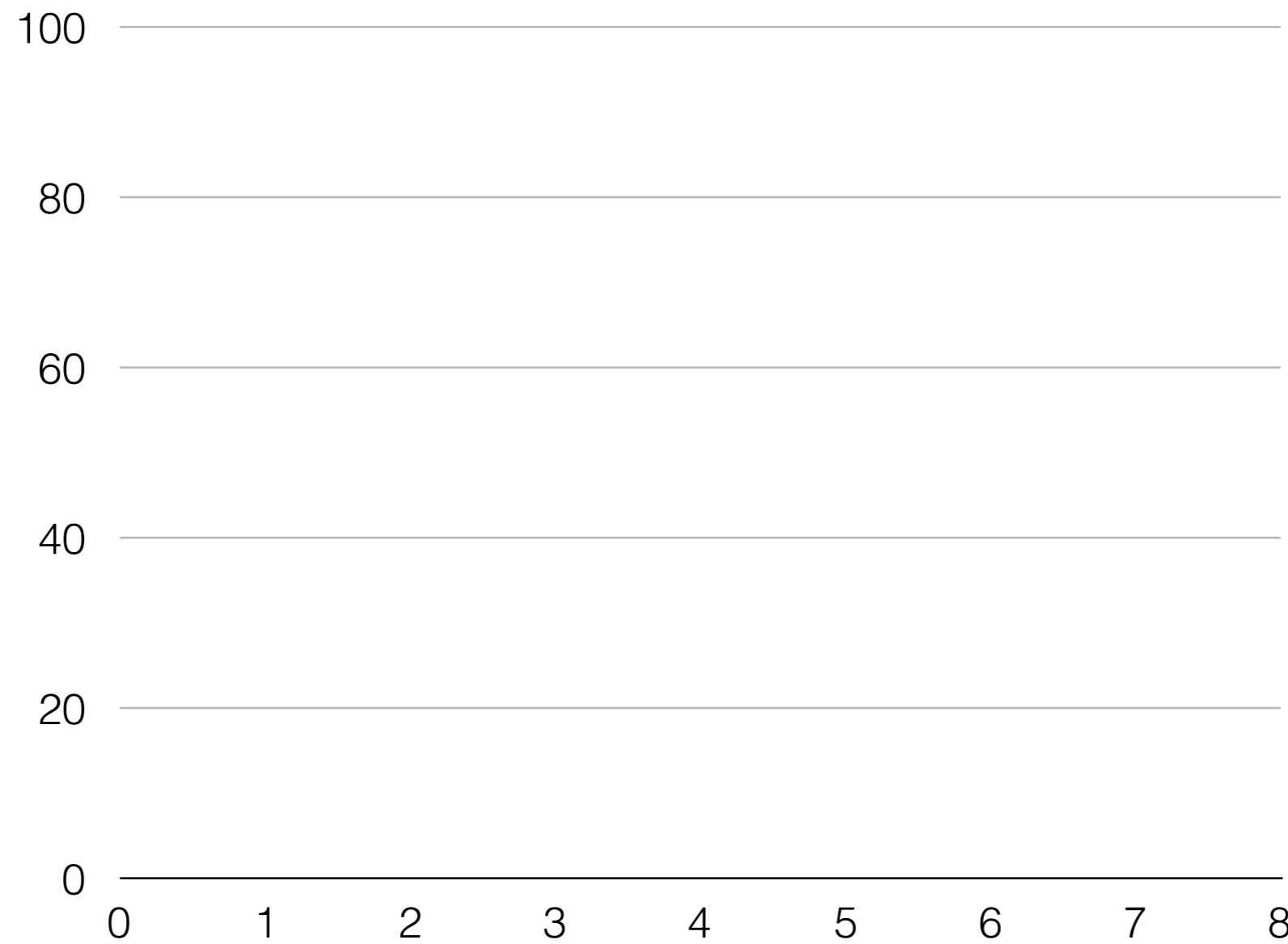
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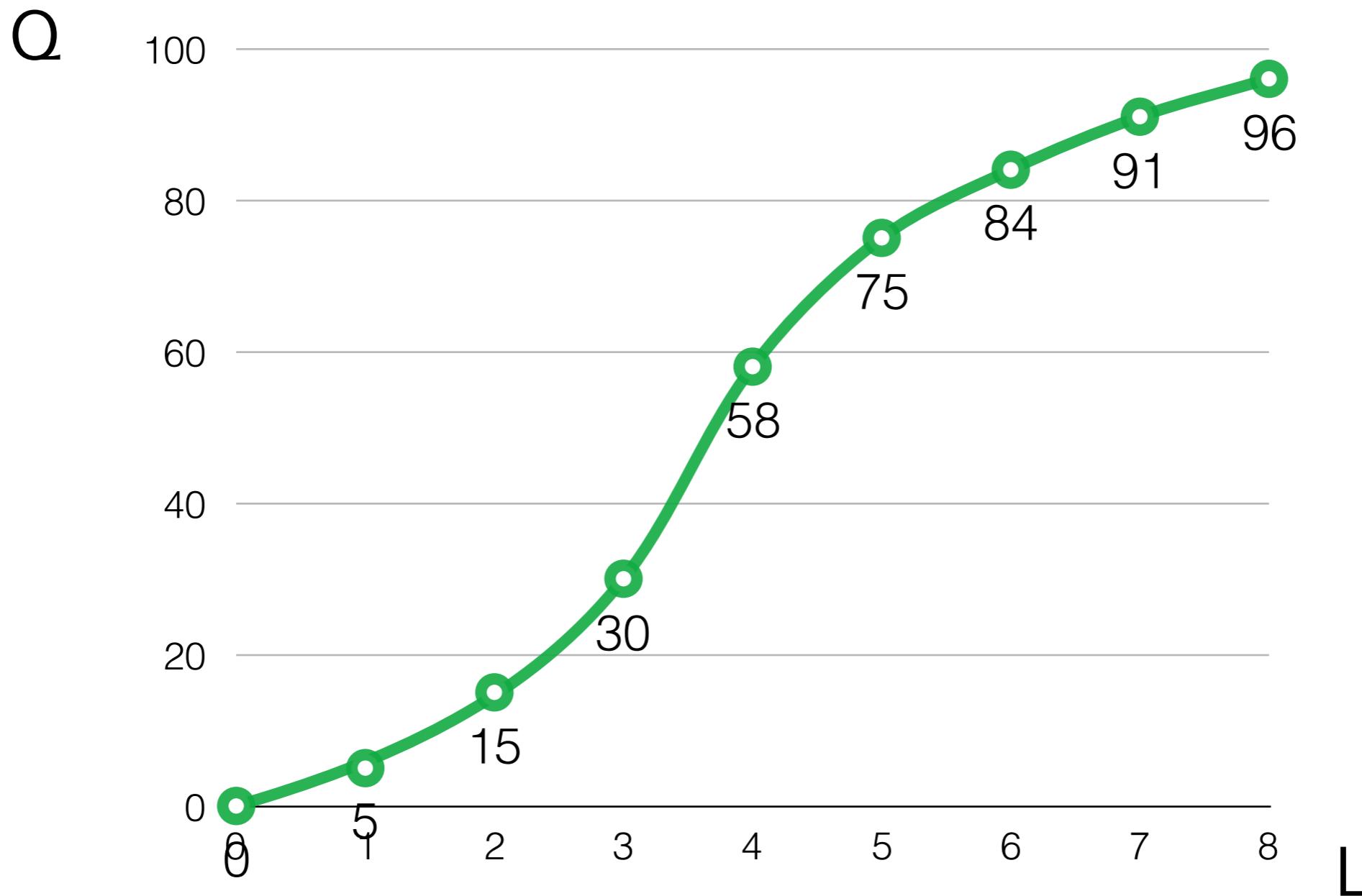


일반적 총생산곡선 General TP Cv.

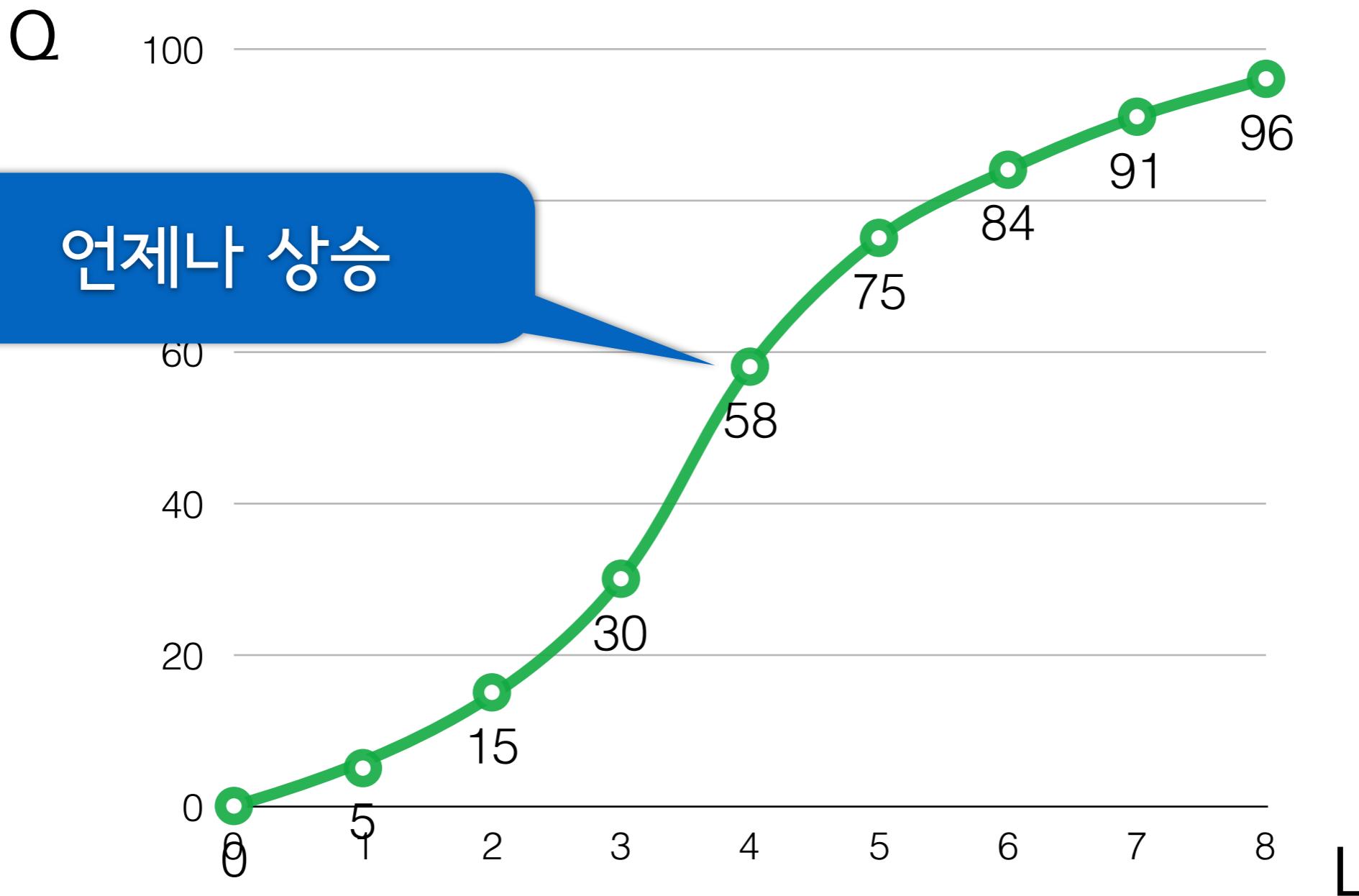
일반적 총생산곡선 General TP Cv.



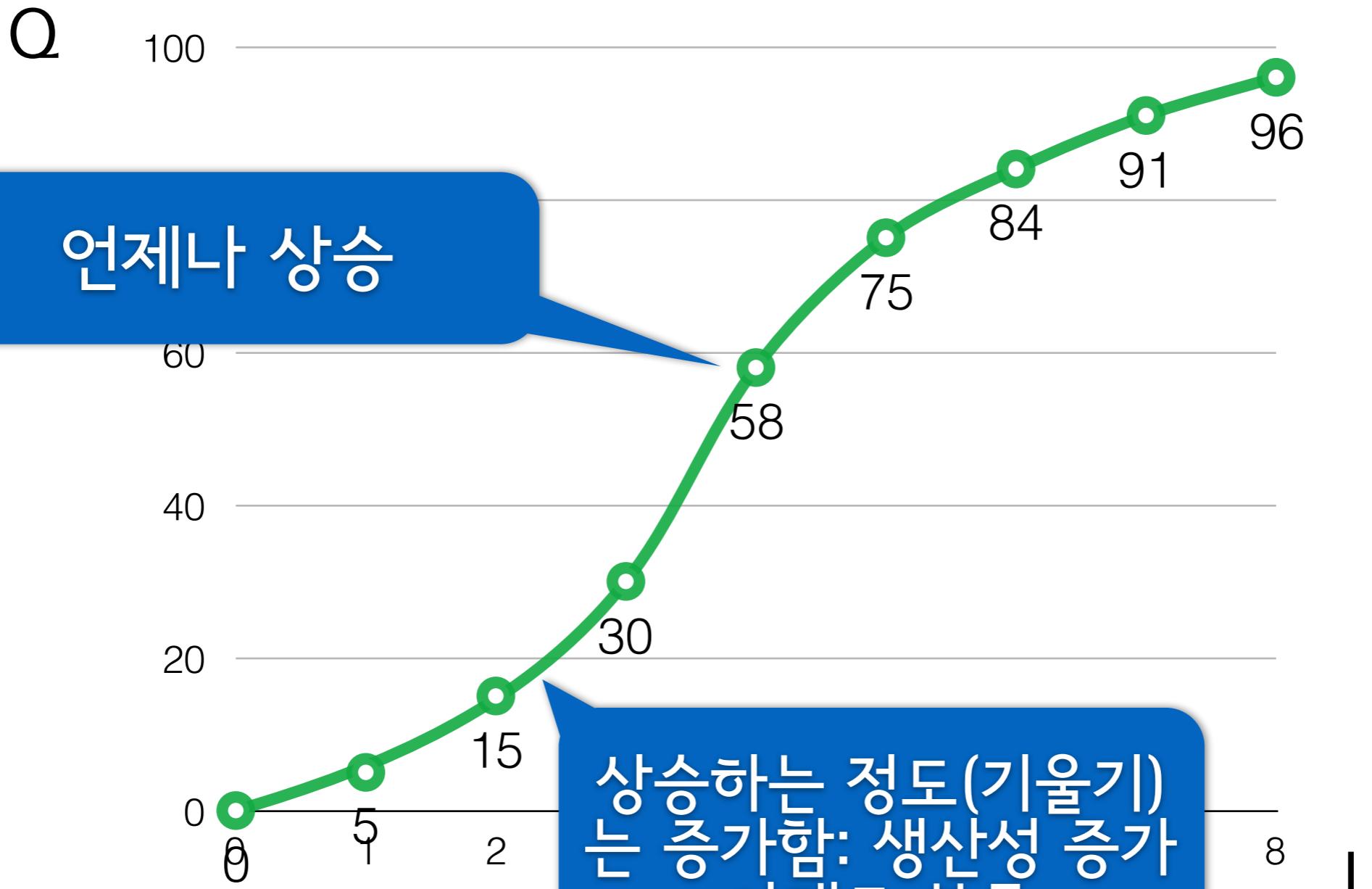
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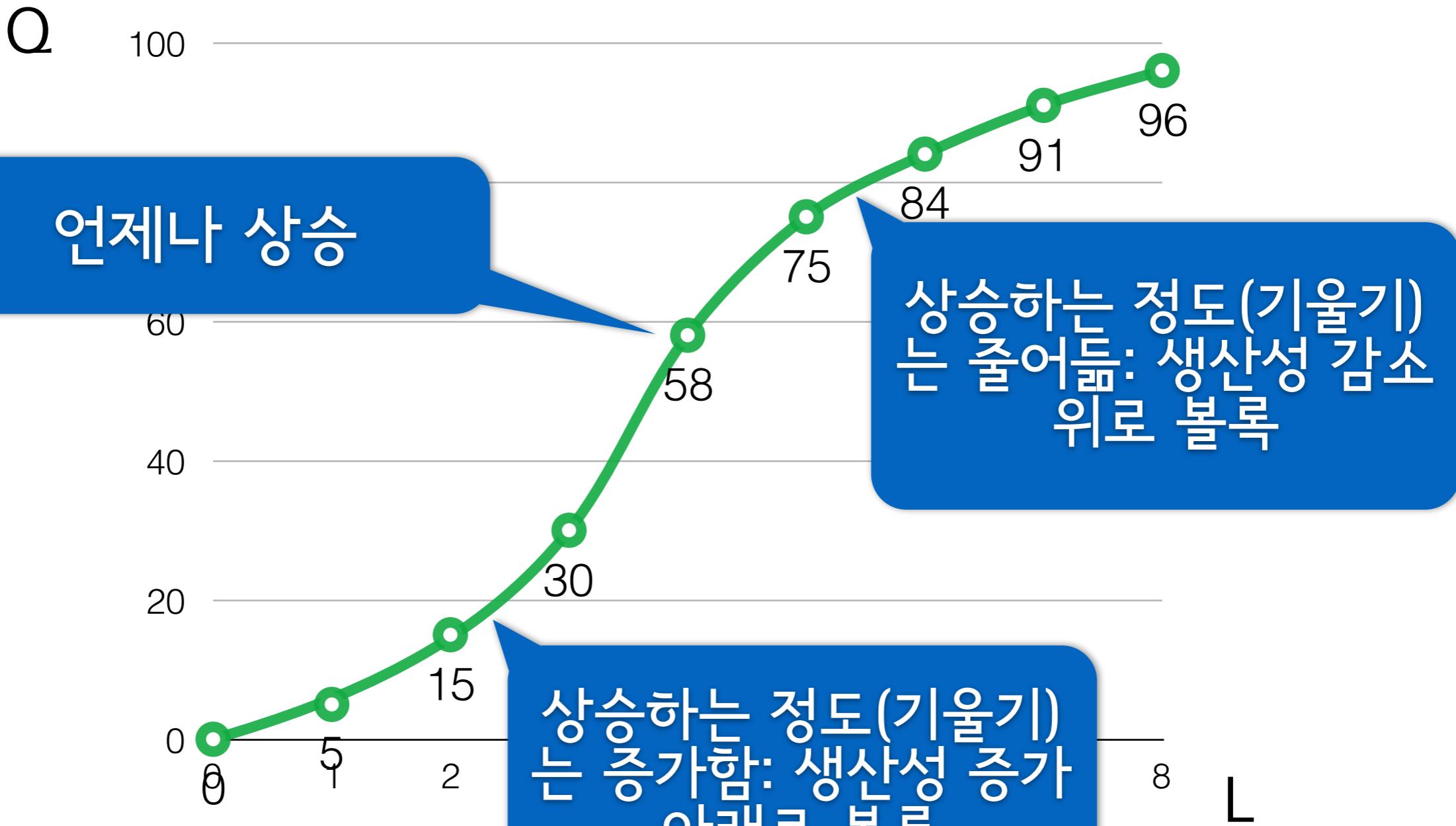
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한계생산

MP: Marginal Product

- MP_L : 노동력 1단위가 추가(ΔL)될 때마다 발생하는 산출량의 변화량(ΔQ): $= \partial Q / \partial L$
- MP_L : TP의 L 에 대한 증가도: TP 곡선의 L 을 기준 축으로 했을 때의 기울기: TP곡선의 input L 에 대한 편미분($\partial Q / \partial L$)
- 단기 쌀농사의 예에서는 노동자만 1명 더(ΔL) 고용하여 투입했을 때마다 발생하는 쌀의 변화량 (ΔQ) = $\Delta Q / \Delta L \approx dQ / dL$
- ceteris paribus: 다른 투입요소량은 변화 없음

MPL: MP of Labor

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$$MPL = \Delta Q / \Delta L$$

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수학적 표현

$$MP_L = \frac{\text{산출량의 변화}}{\text{노동투입량 변화}} = \frac{\Delta Q}{\Delta L} \approx \frac{\partial Q}{\partial L}$$

- TPC의 기울기와 같다!
- 투입요소가 한가지(L)뿐이므로 $MP = MPL$

MPC: Marginal Product Curve

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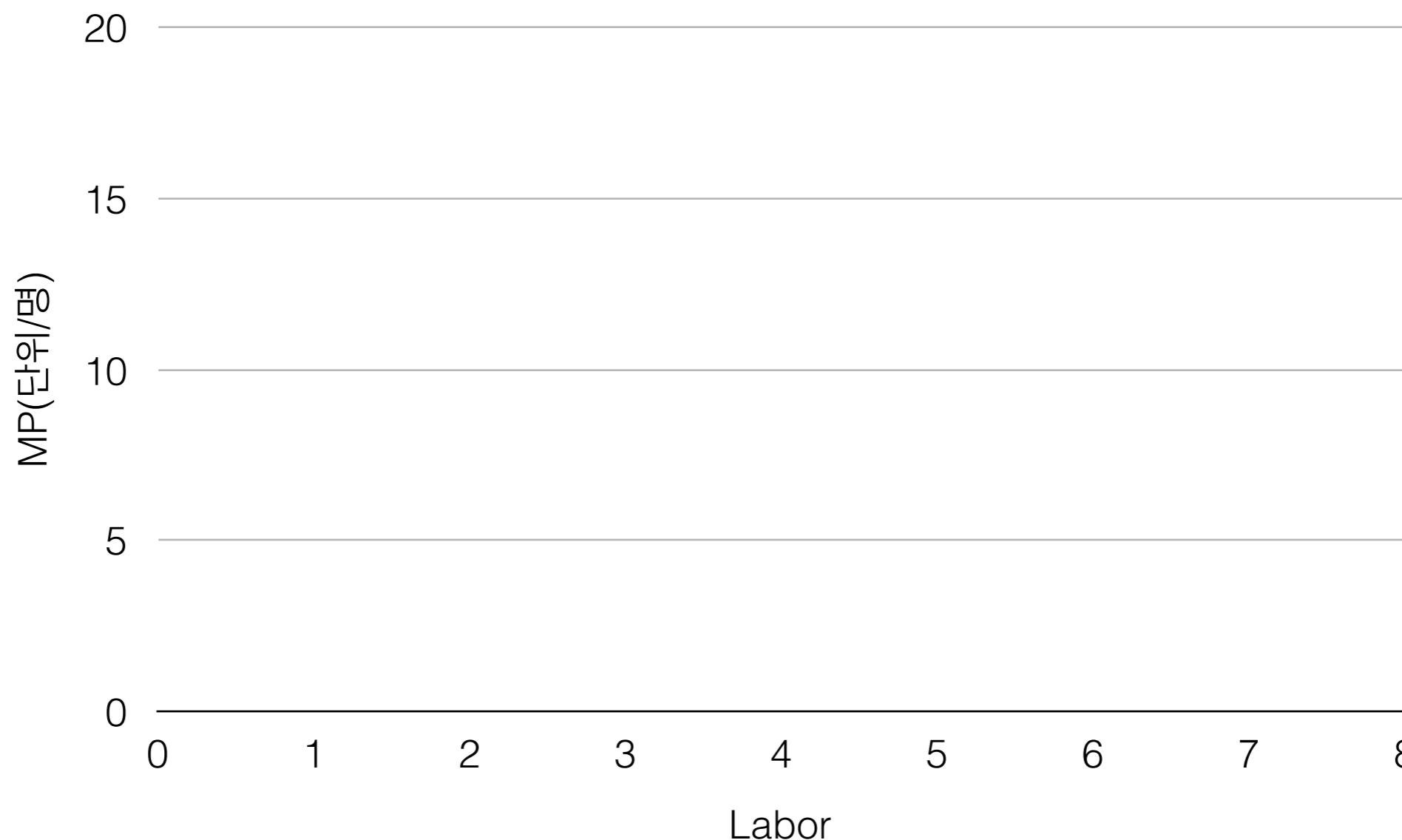
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边际产量曲线

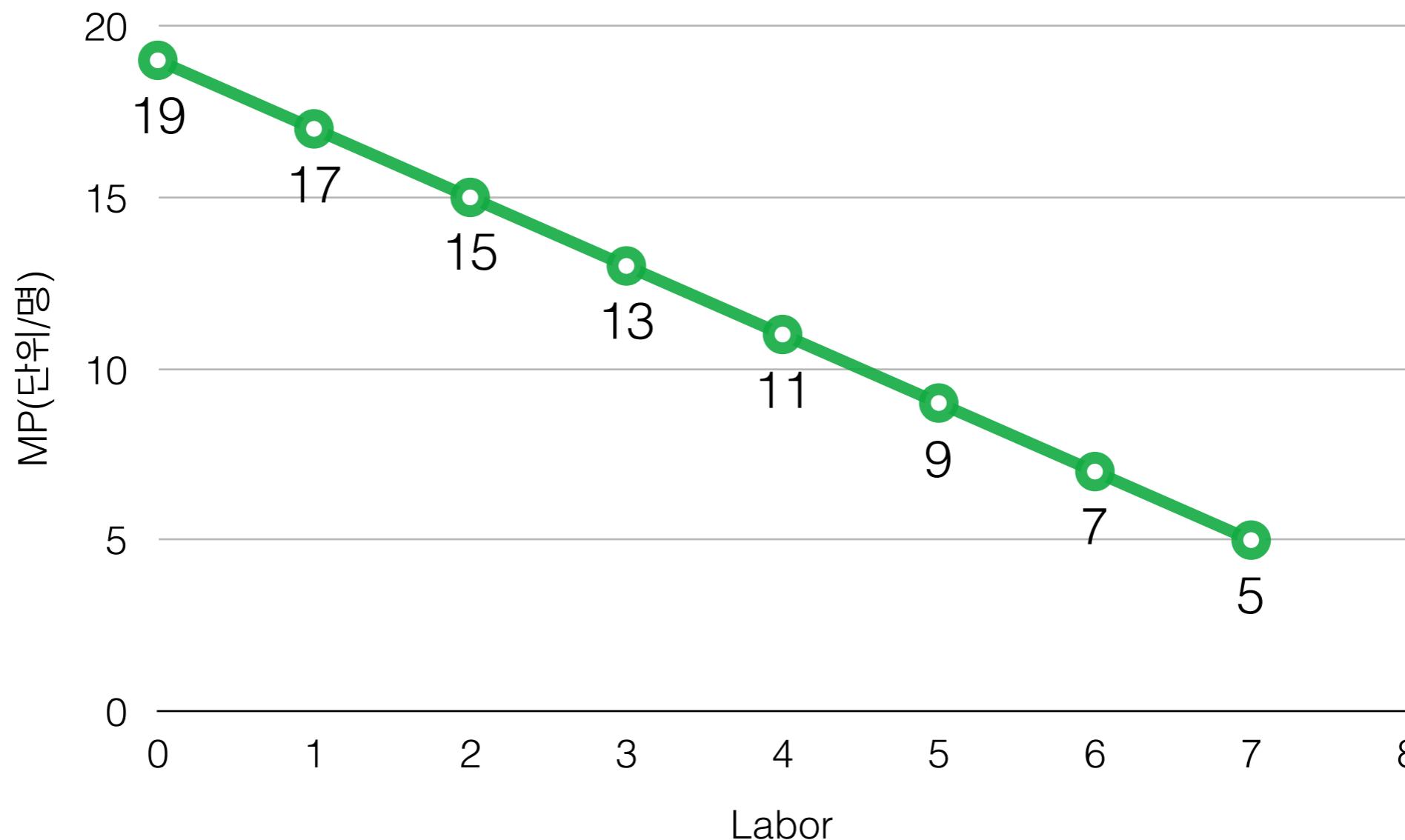
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C: Marginal Product Curve



L(명)	Q(단위)	MPL(단위/명)
0	0	19
1	19	17
2	36	15
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C: Marginal Product Curve



Ex2: 고정투입요소 증가

- 토지 투입량을 10ha → 20ha로 2배(농기계도 2배) 증가시킴 → 생산함수 변화
- 고정투입요소의 전반적 증가는 생산규모의 증대로 해석가능
- 생산함수 재측정한 결과 1인당 생산량이 기존의 생산량보다 2배 가 된 경우 ⇒ TP, MP곡선 모두 상향 이동

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L(명)	Q(단위)
0	0
1	38
2	72
3	102
4	128
5	150
6	168
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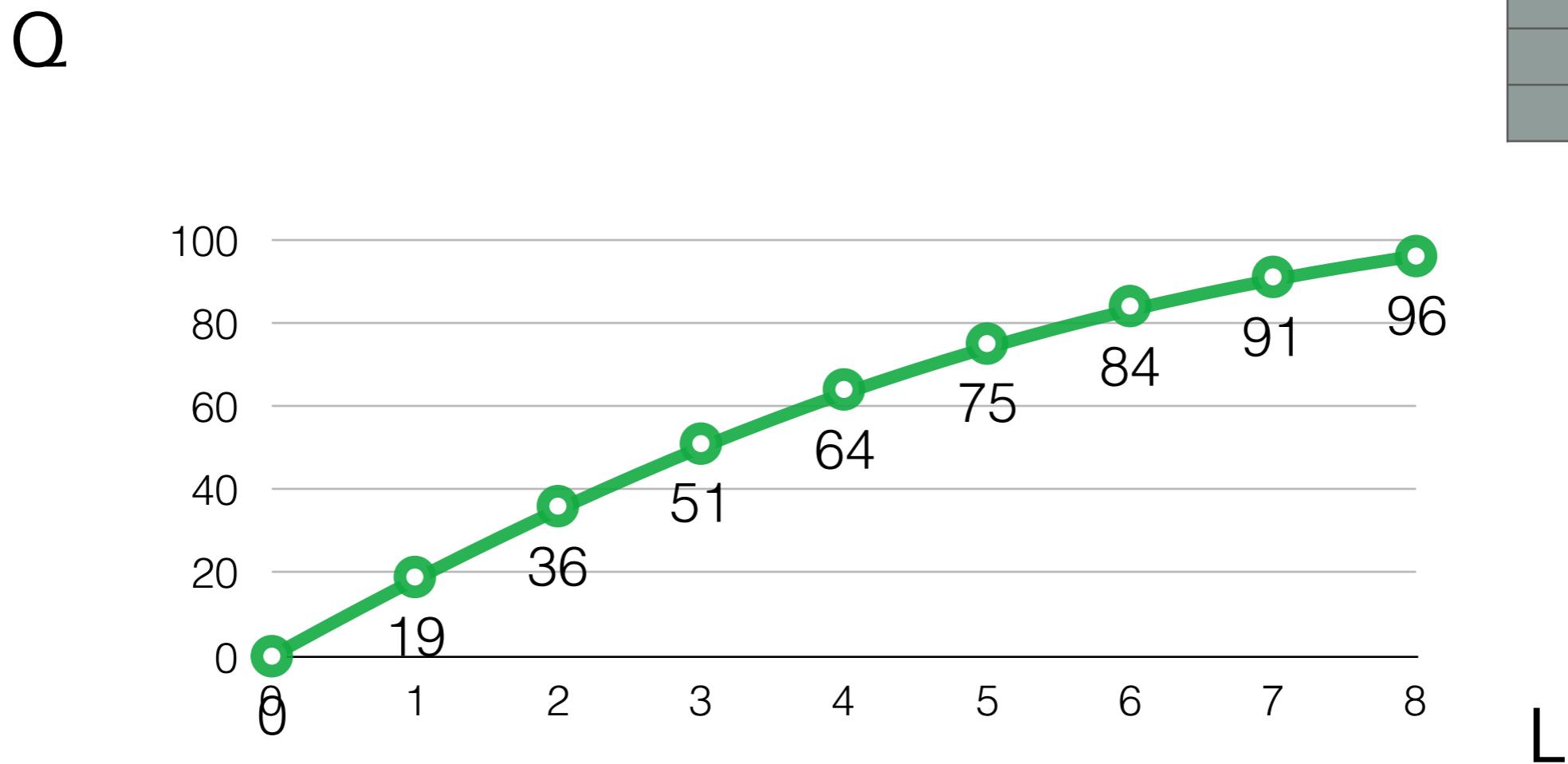
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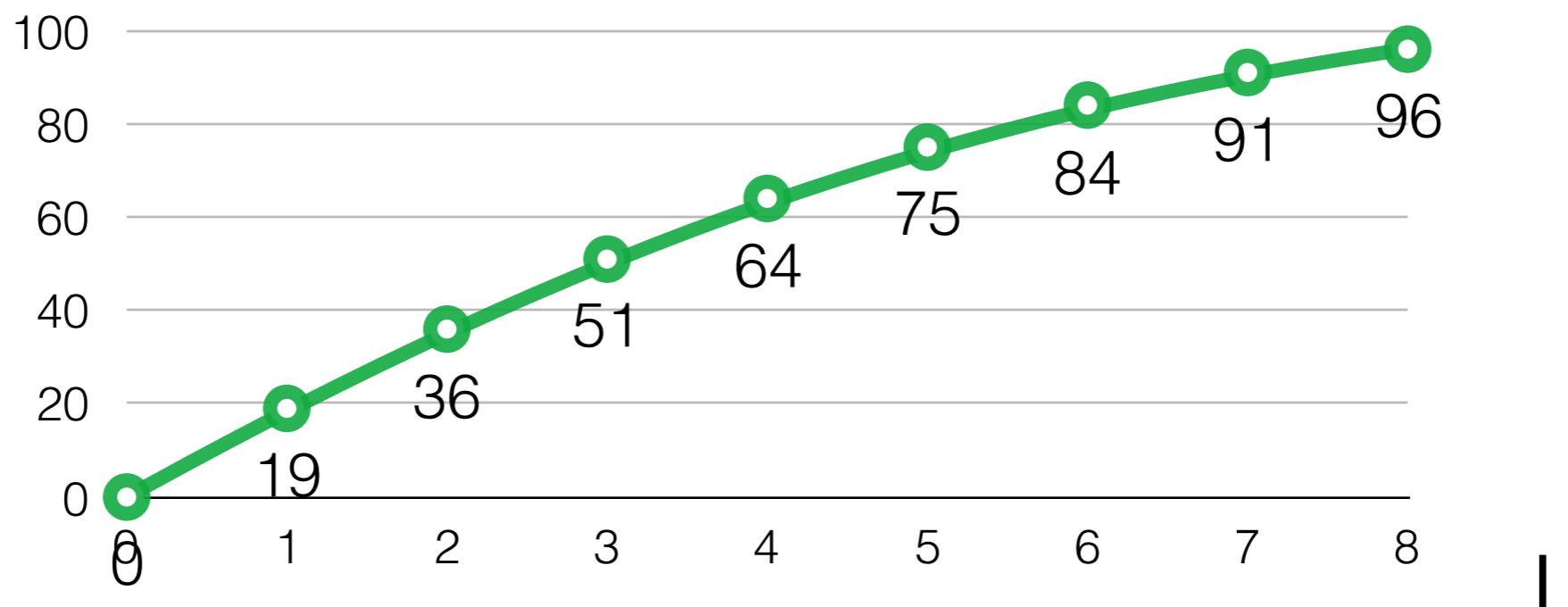
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Q

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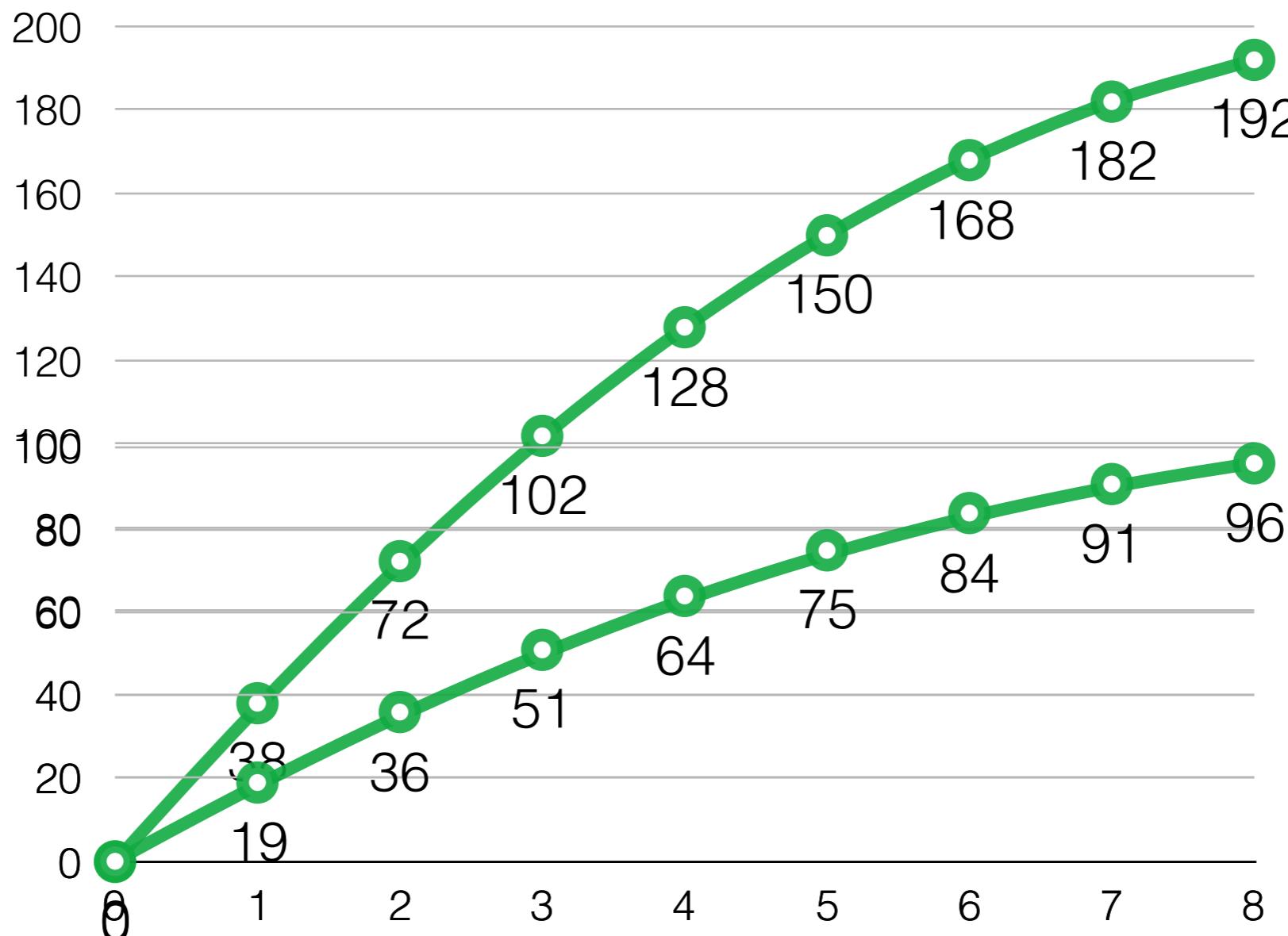


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Q

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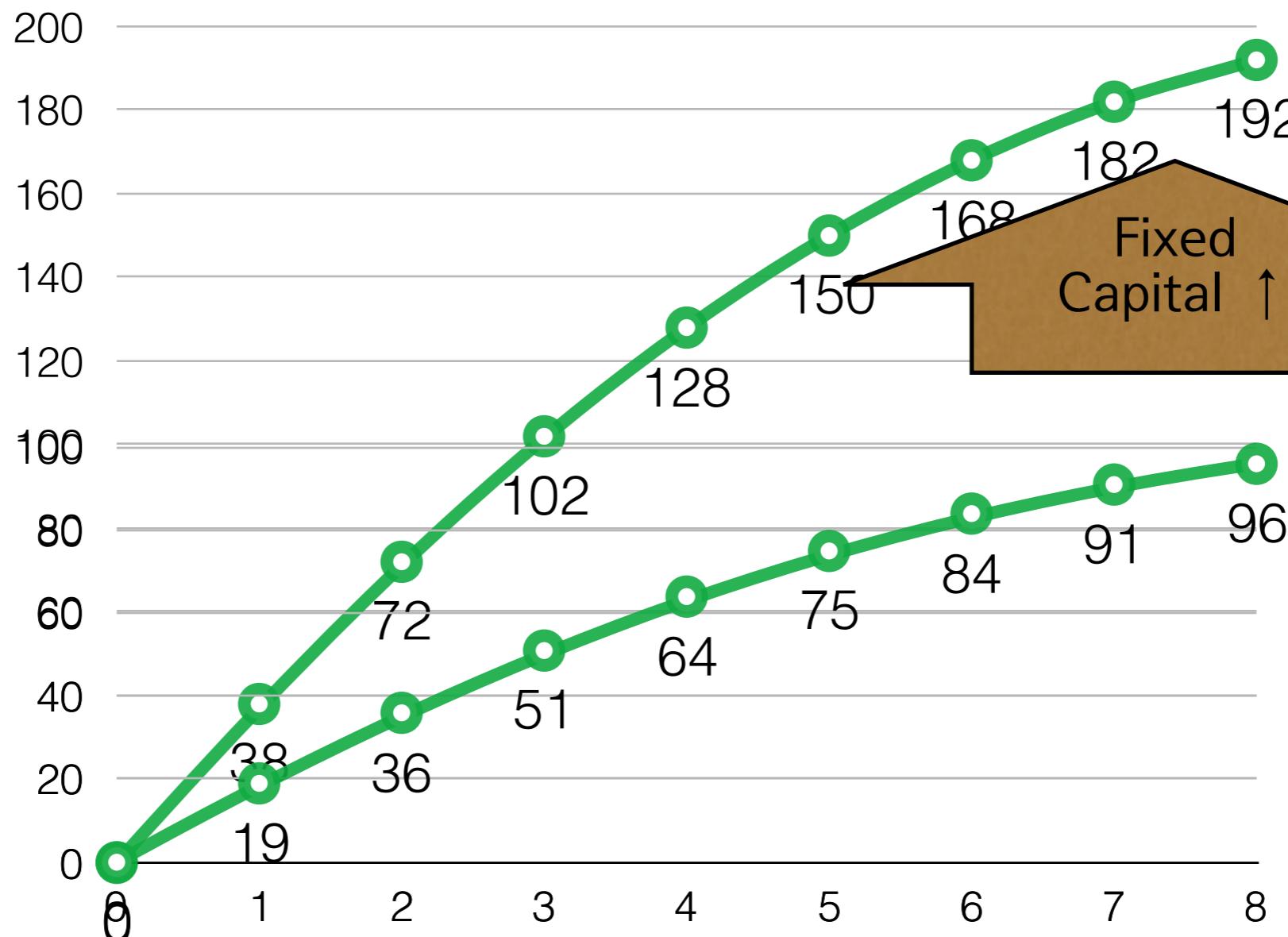
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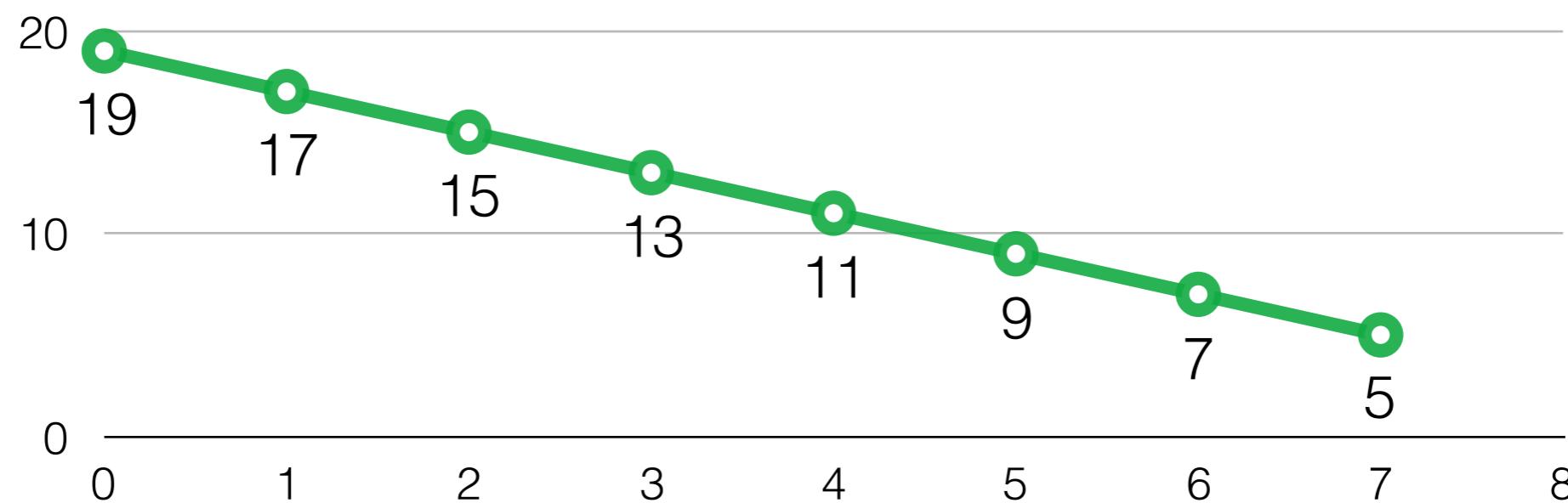
MPC: Marginal Product Cv

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L	MPL1
0	19
1	17
2	15
3	13
4	11
5	9
6	7
7	5
8	

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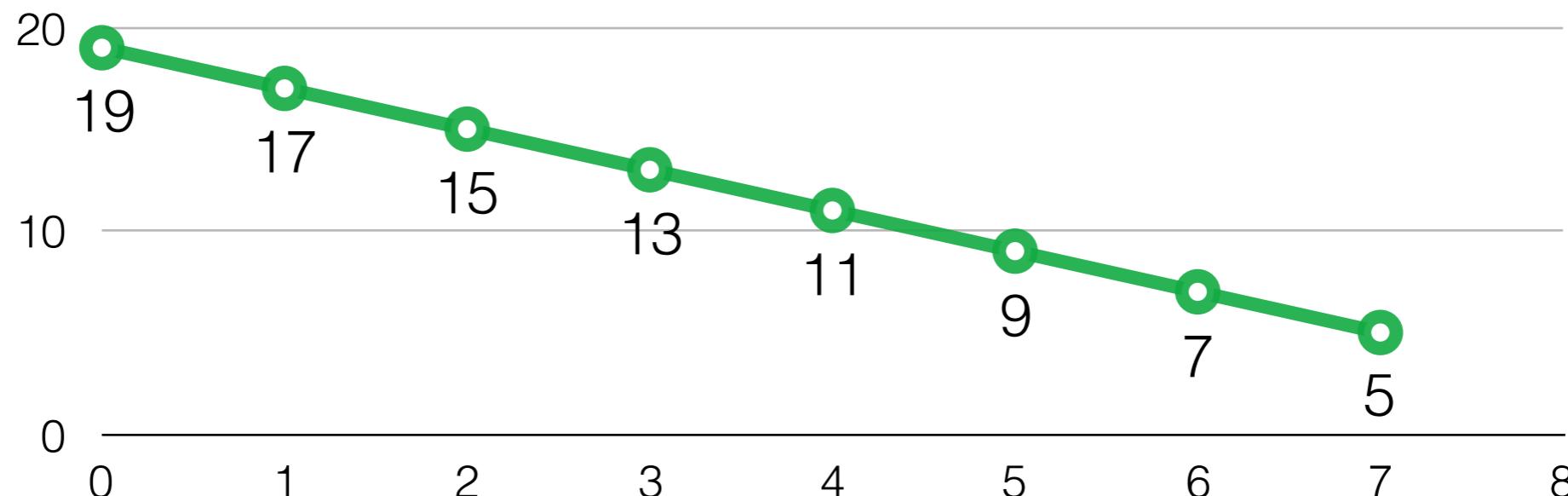
L	MPL1
0	19
1	17
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8	



MPC: Marginal Product Cv

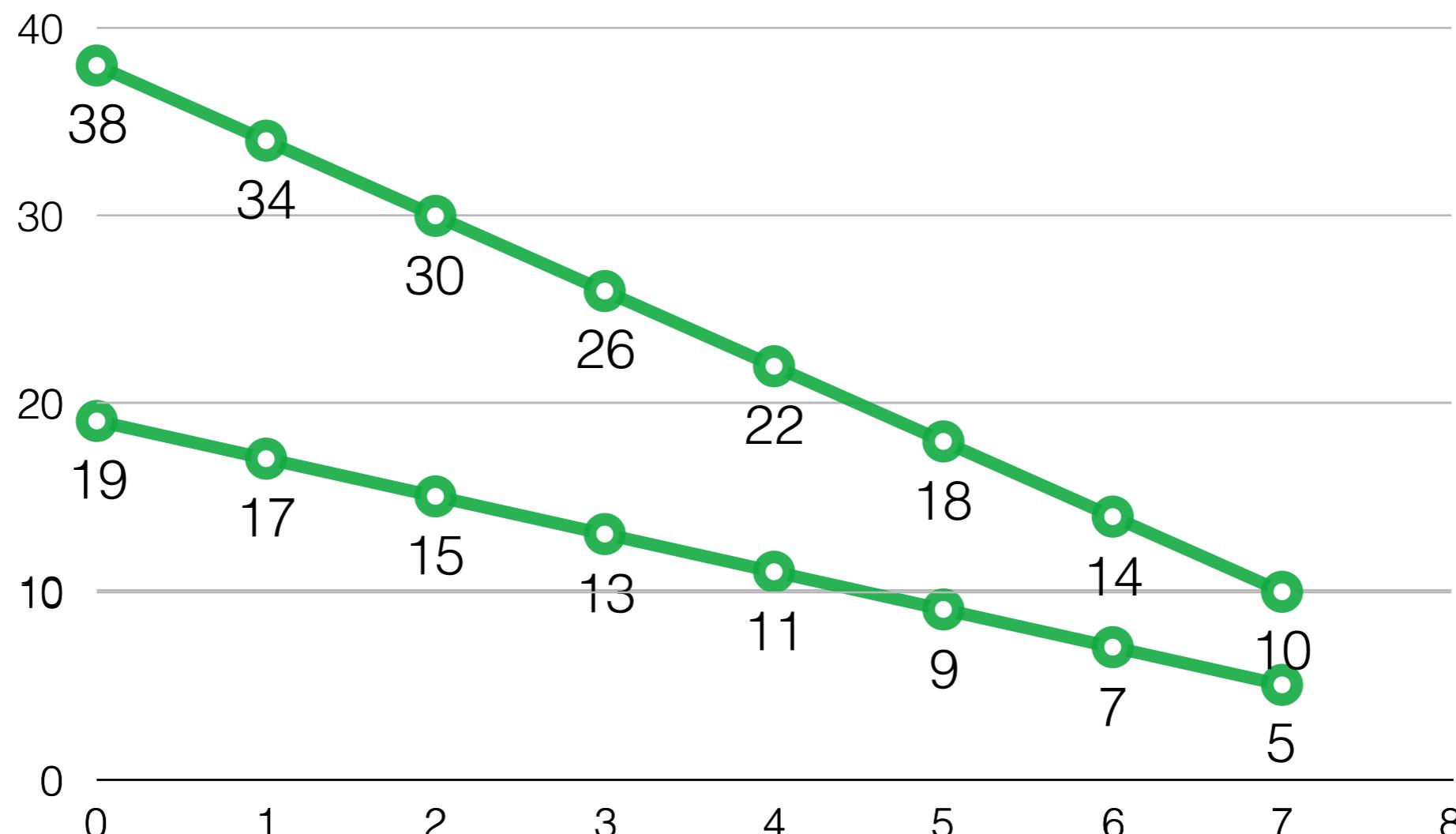
L	MPL1
0	19
1	17
2	15
3	13
4	11
5	9
6	7
7	5
8	

L	MPL2
0	38
1	34
2	30
3	26
4	22
5	18
6	14
7	10
8	



MPC: Marginal Product Cv

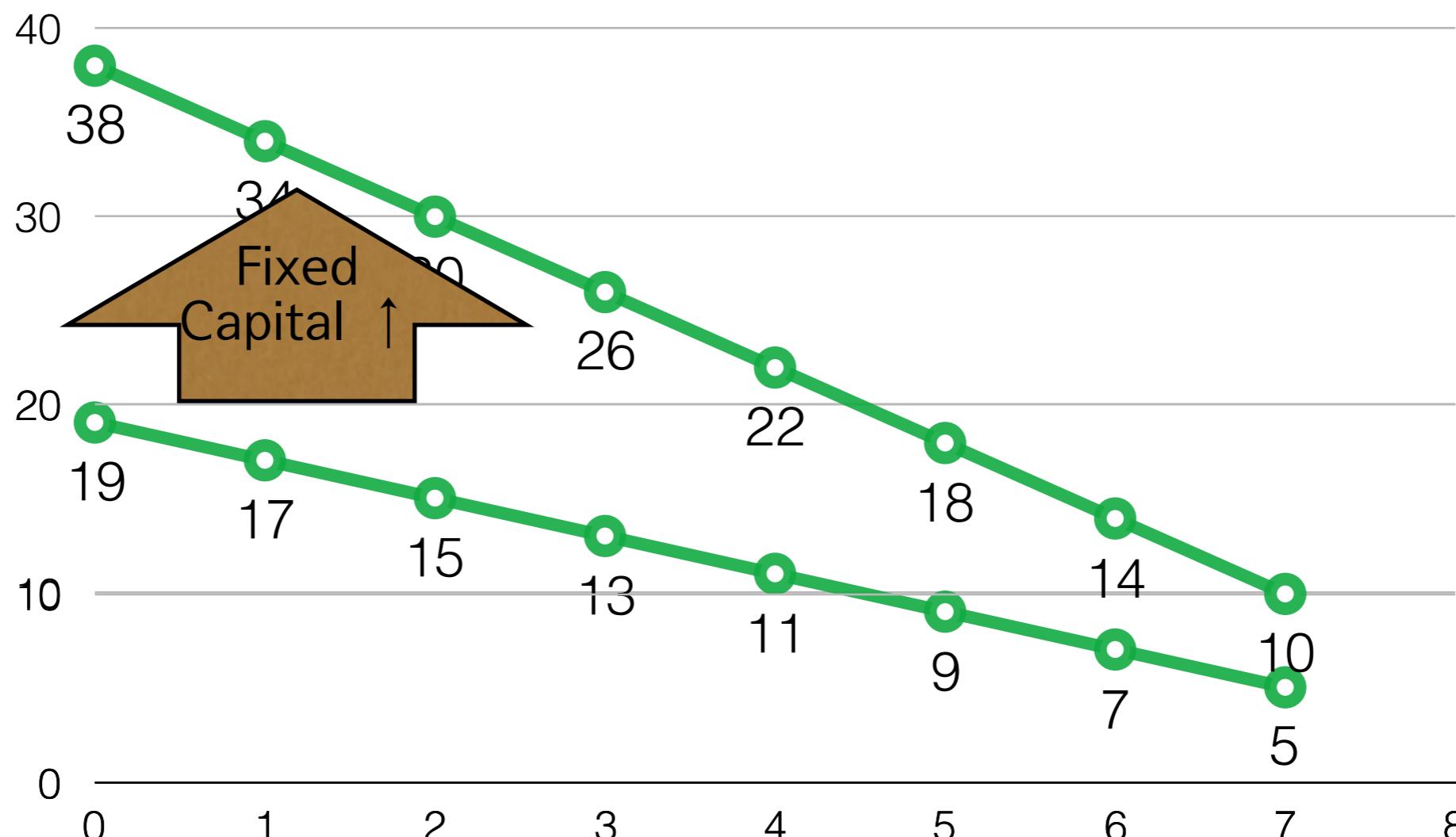
L	MPL1
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2	15
3	13
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0	19
1	17
2	15
3	13
4	11
5	9
6	7
7	5
8	

L	MPL2
0	38
1	34
2	30
3	26
4	22
5	18
6	14
7	10
8	



비용
Cost

비용 Cost

- 공급자의 의사결정을 위해서는 생산함수로부터 비용정보를 산출해 내야 함
 - 고정비용(Fixed Cost): 고정투입요소(토지, 자본)로 인해 발생한 비용
 - 가변비용(Variable Cost): 가변투입요소(원료, 노동력 등)로 인해 발생한 비용
 - 총비용(Total Cost): $TC \equiv FC+VC$

Ex: 앞에서의 쌀 사업의 FC, VC, TC(단기)

- $FC = 400\text{만원}$ (고정)
- $VC = 200\text{만원} \times L$
- $TC = 400\text{만원} + 200\text{만원} \times L$

TC table

TC table

L(명)
0
1
2
3
4
5
6
7
8

TC table

L(명)	Q(단위)
0	0
1	19
2	36
3	51
4	64
5	75
6	84
7	91
8	96

TC table

L(명)	Q(단위)	VC(만원)
0	0	0
1	19	200
2	36	400
3	51	600
4	64	800
5	75	1000
6	84	1200
7	91	1400
8	96	1600

TC table

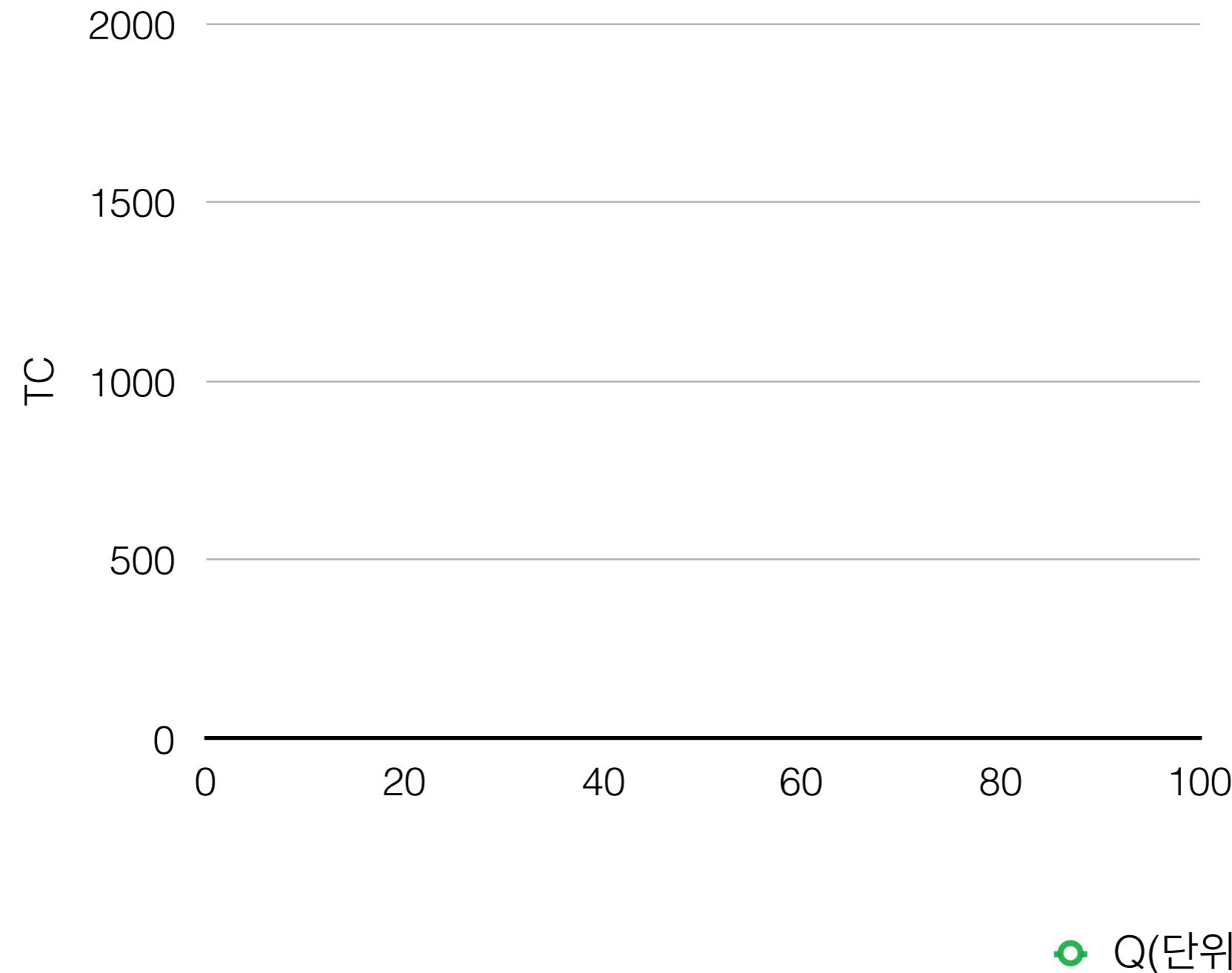
L(명)	Q(단위)	VC(만원)	FC(만원)
0	0	0	400
1	19	200	400
2	36	400	400
3	51	600	400
4	64	800	400
5	75	1000	400
6	84	1200	400
7	91	1400	400
8	96	1600	400

TC table

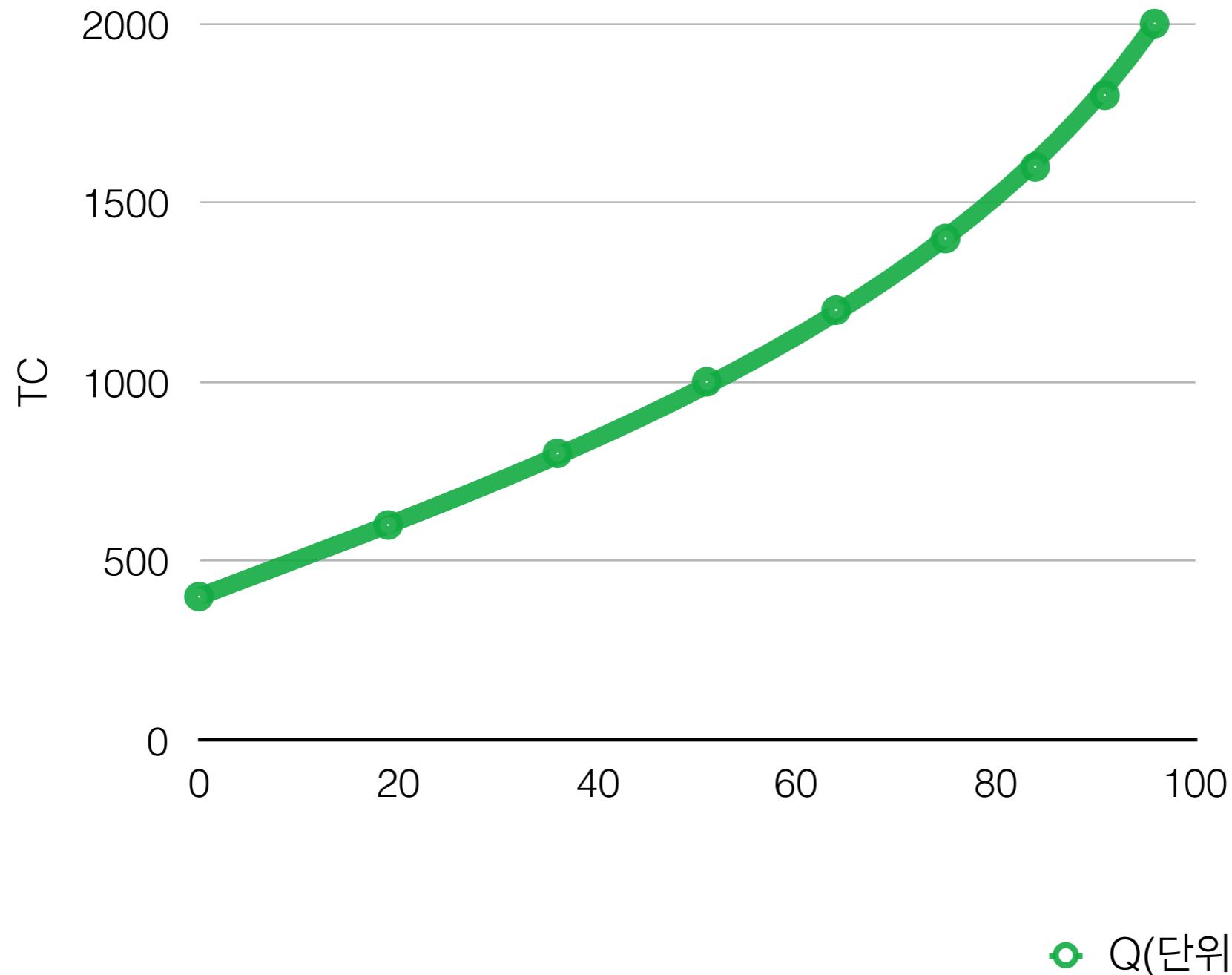
L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)
0	0	0	400	400
1	19	200	400	600
2	36	400	400	800
3	51	600	400	1000
4	64	800	400	1200
5	75	1000	400	1400
6	84	1200	400	1600
7	91	1400	400	1800
8	96	1600	400	2000

TC curve

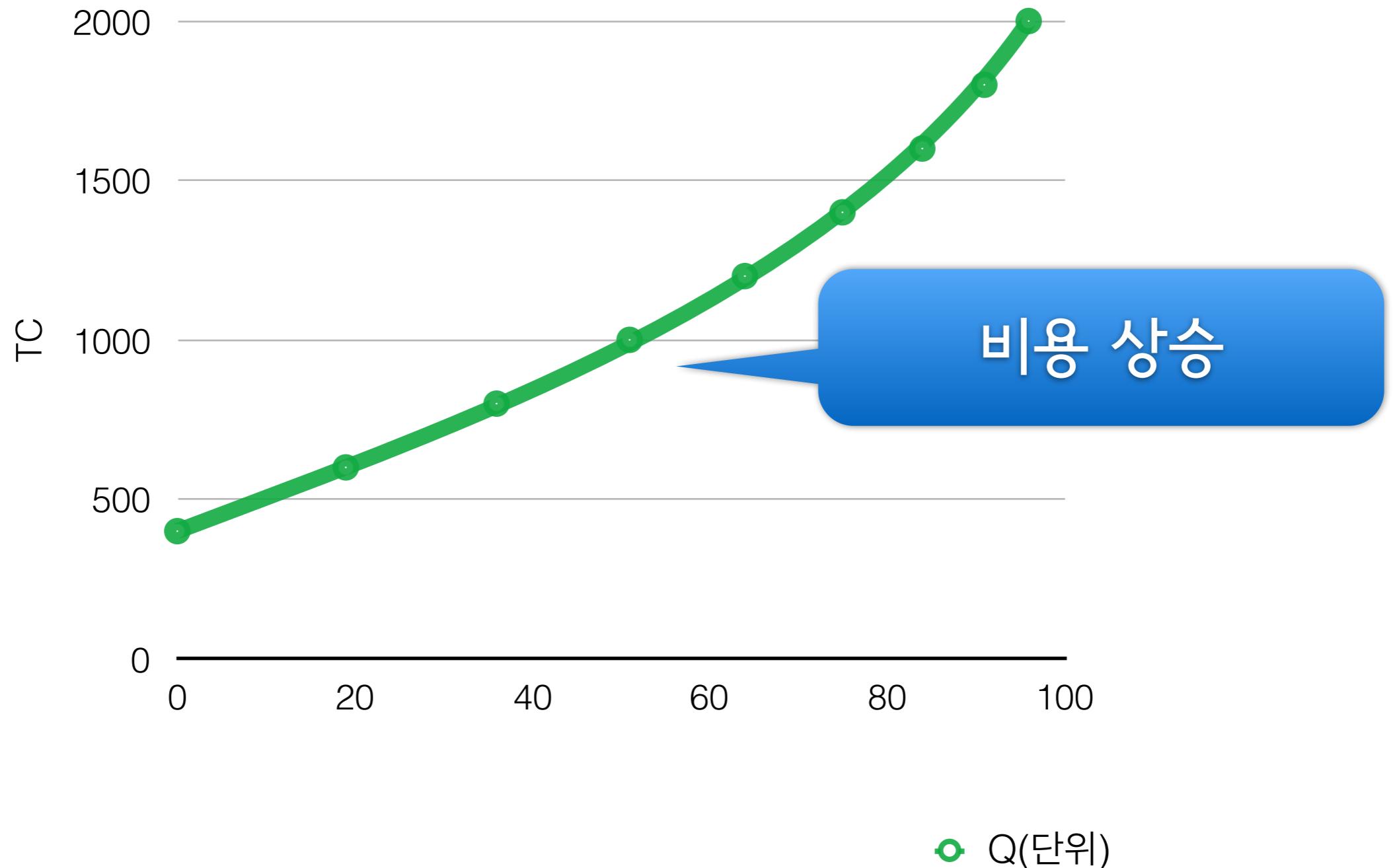
TC curve



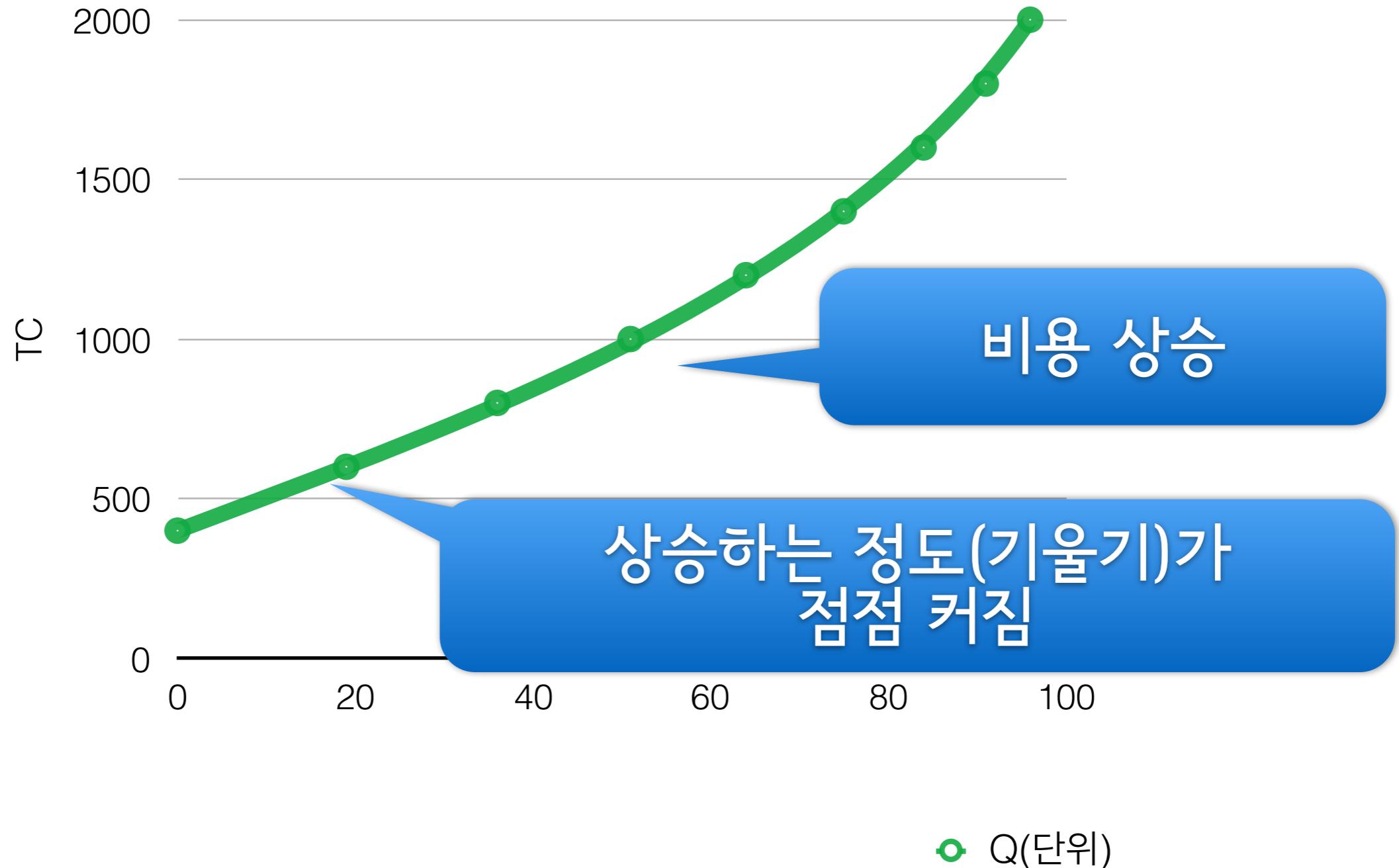
TC curve



TC curve



TC curve



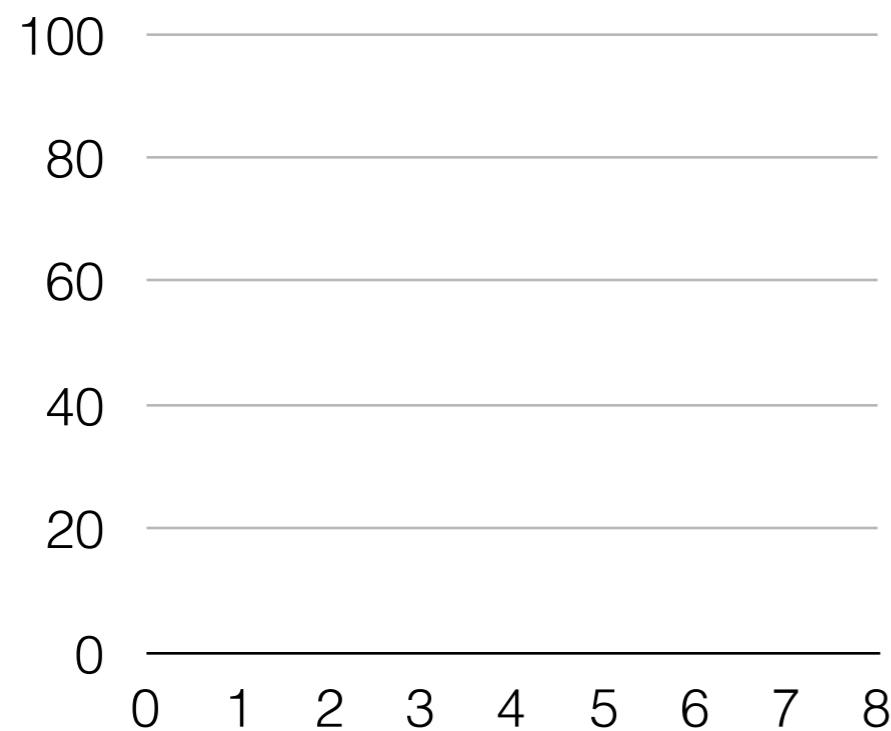
총비용 함수

Total Cost Function

- $TC(L) = 400 + 200L$
- $Q = f(L) \Rightarrow L = f^{-1}(Q)$
- $TC'(Q) = TC(L) = TC(f^{-1}(Q))$
- Q 에 대한 TC' 를 앞으로는 L 에 대한 TC 와 구분없이 TC 로 표기할 것임.
- L 과 TC 가 직선(선형) 관계이므로 Q 에 대한 TC 의 관계는 $f^{-1}(Q)$ 의 특성(아래로 볼록)을 지니게 됨
- 자세한 것은 경제수학, 미시경제학에서..

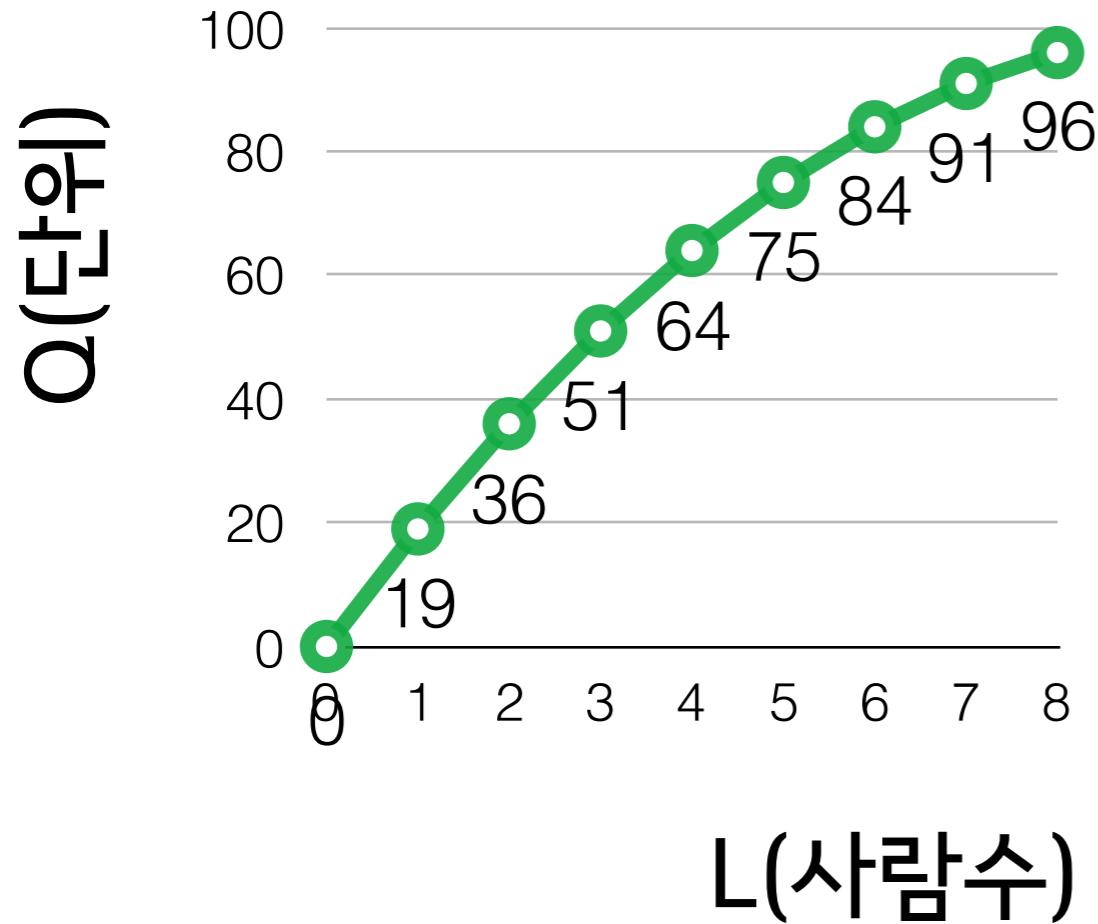
TC Cv. & TP Cv

TC Cv. & TP Cv



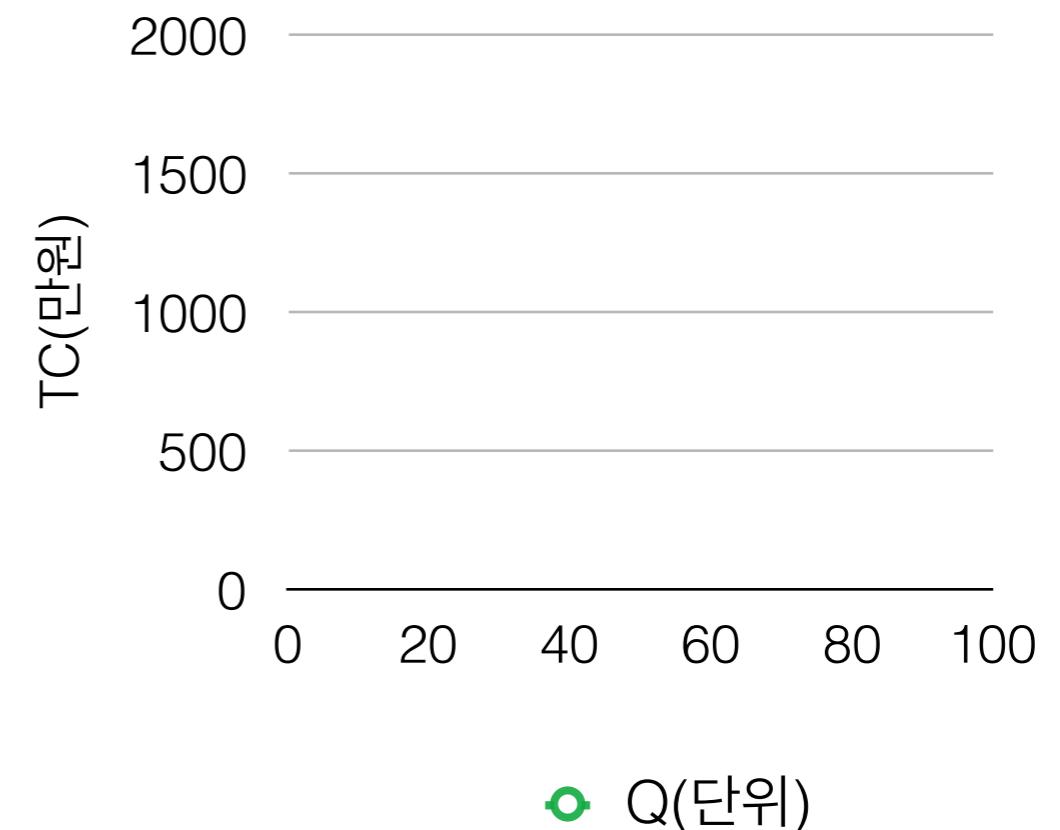
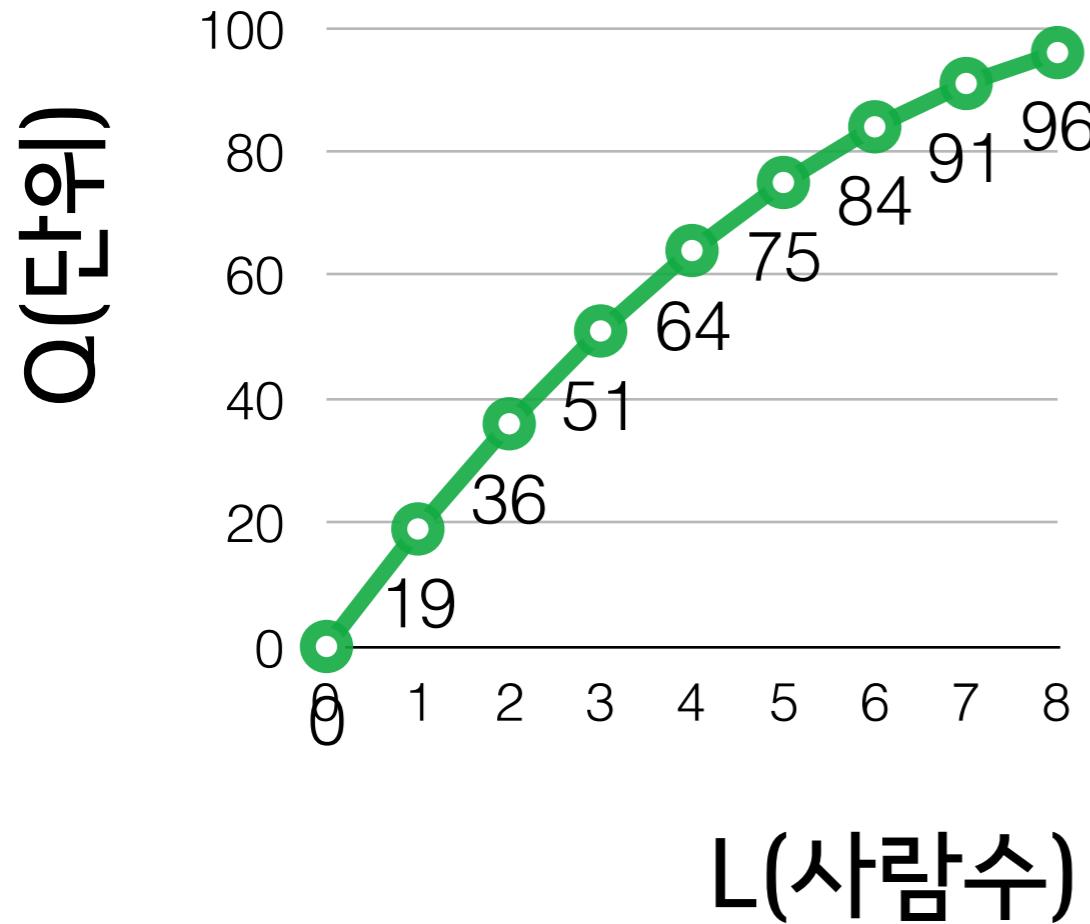
TC Cv. & TP Cv

TP Curve



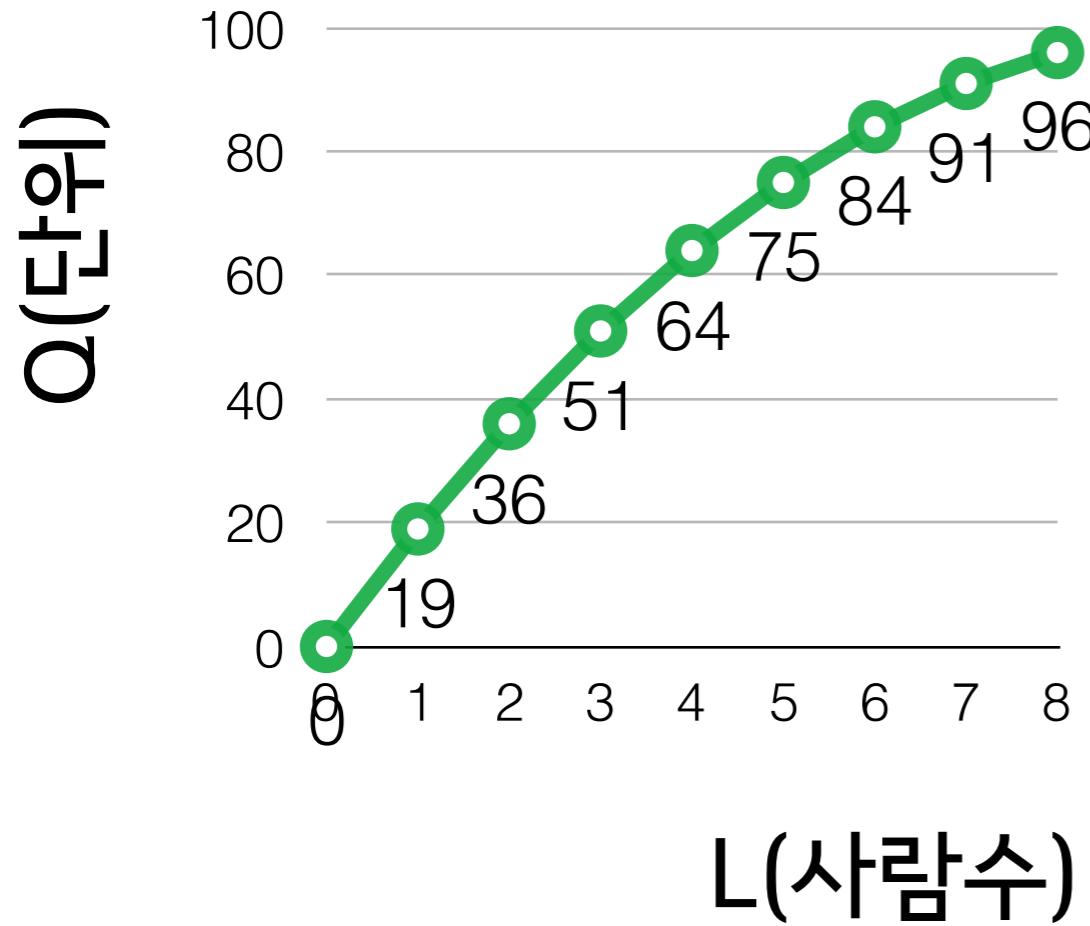
TC Cv. & TP Cv

TP Curve

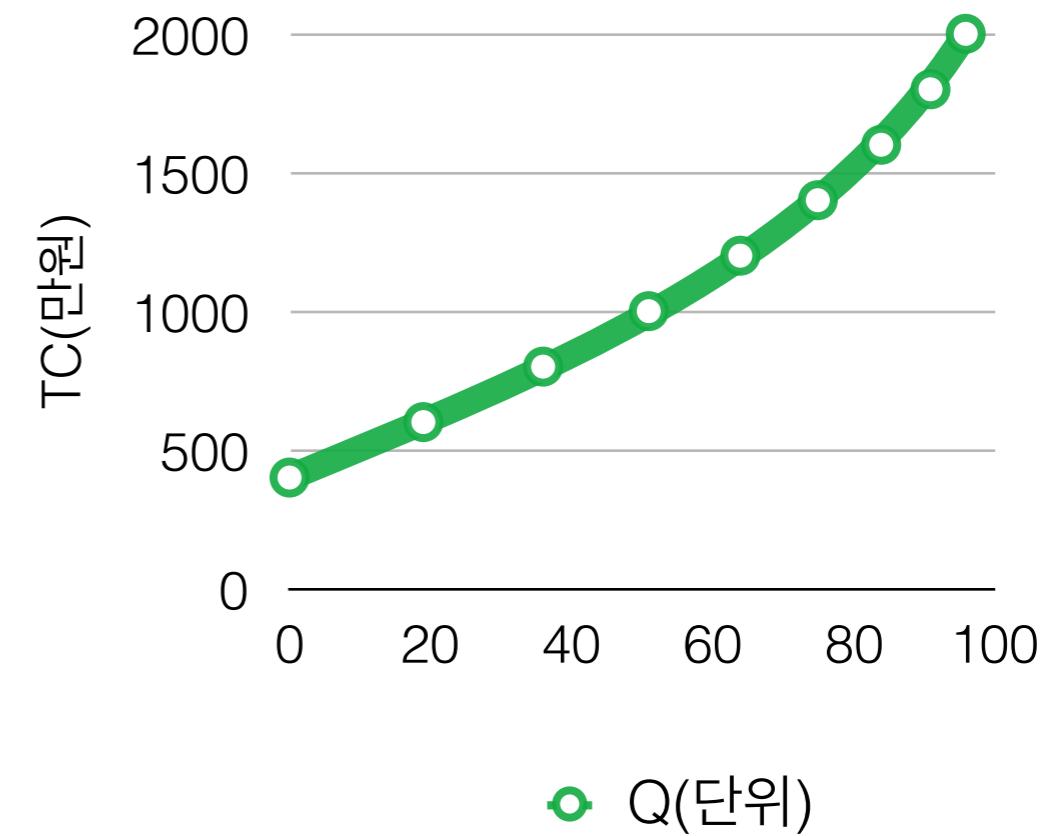


TC Cv. & TP Cv

TP Curve

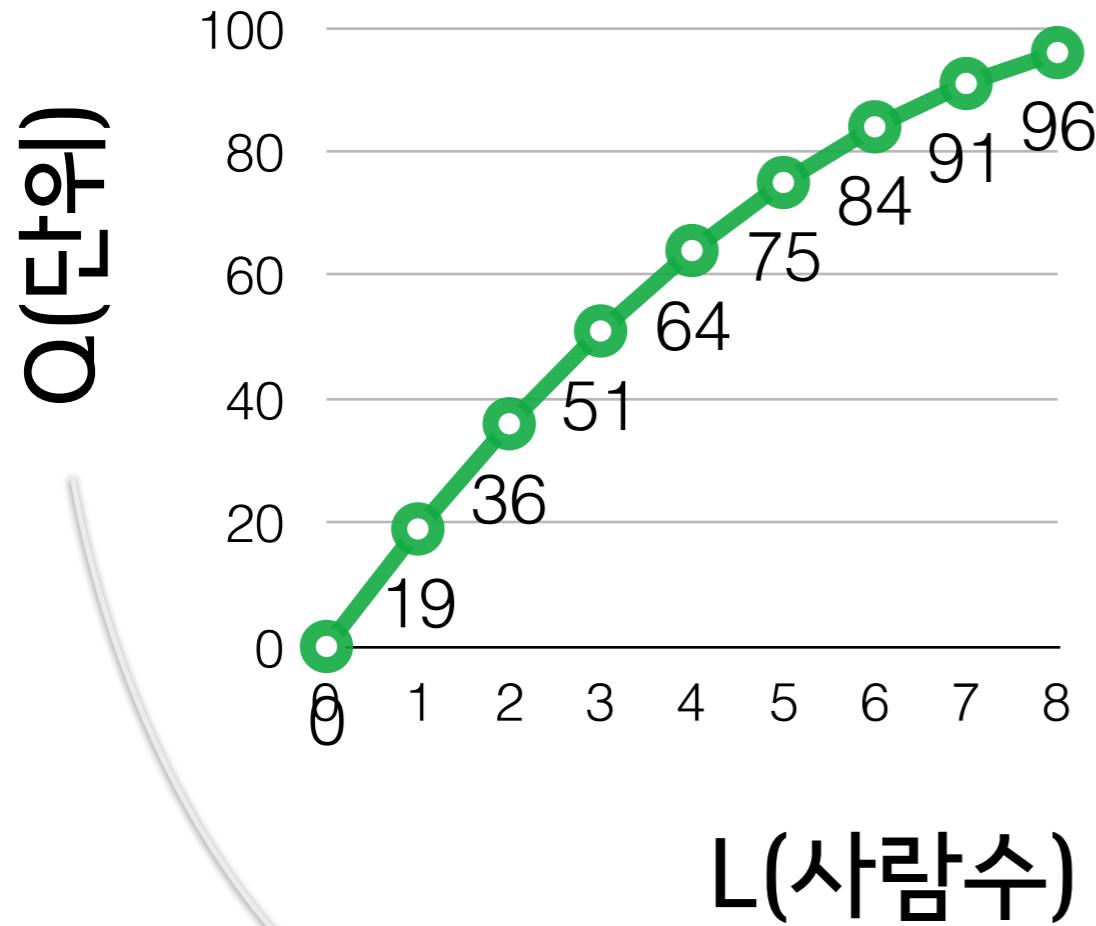


TC Curve

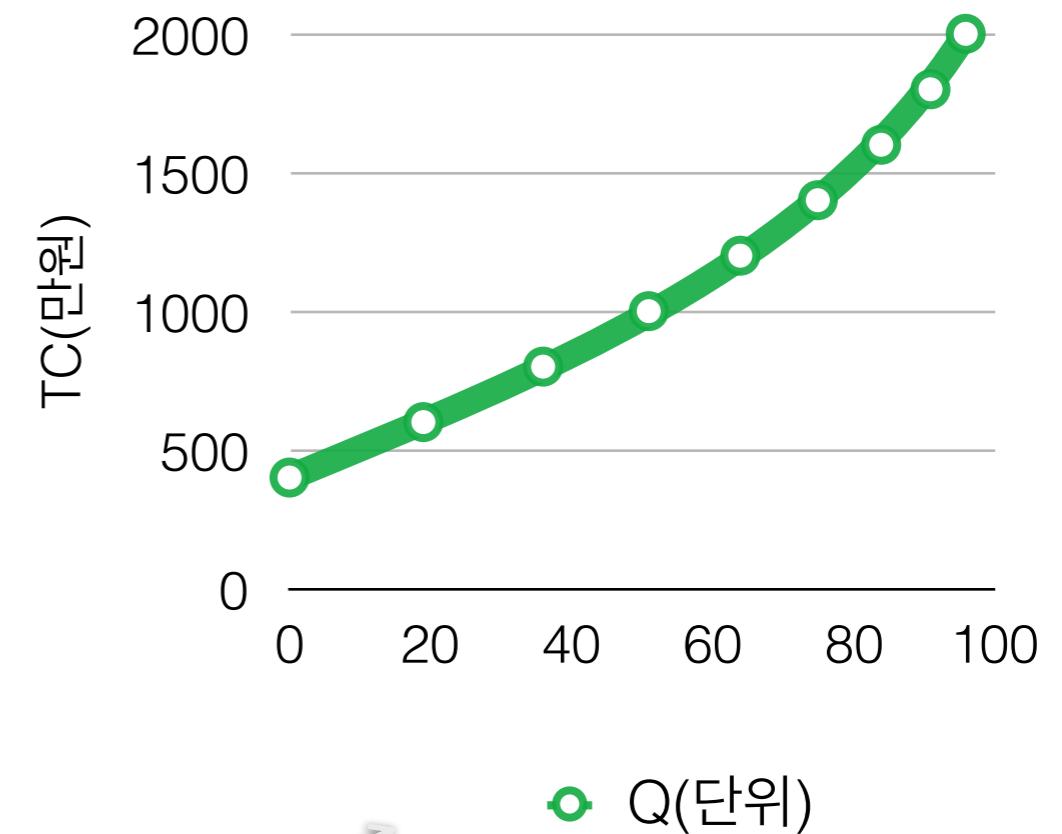


TC Cv. & TP Cv

TP Curve

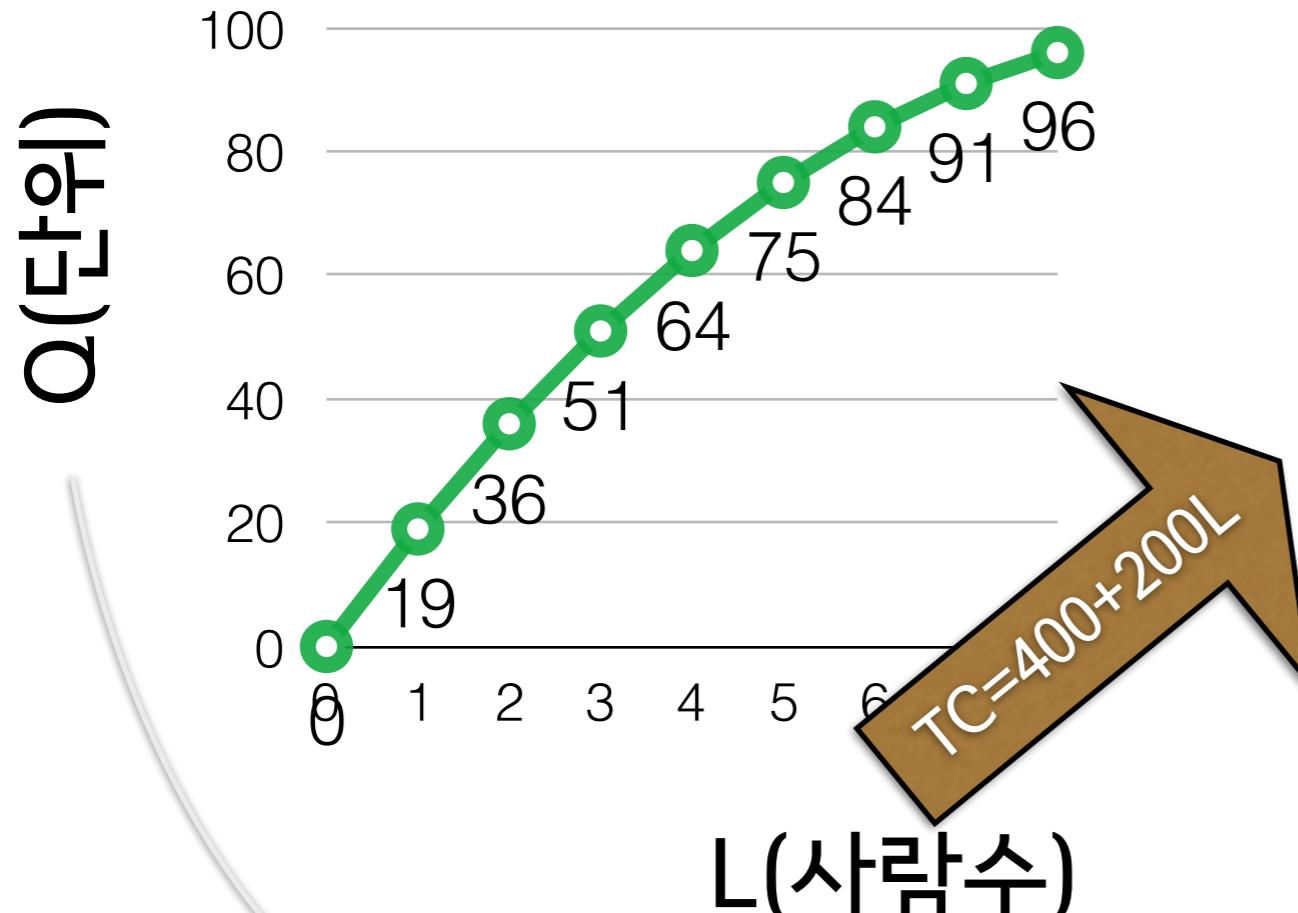


TC Curve

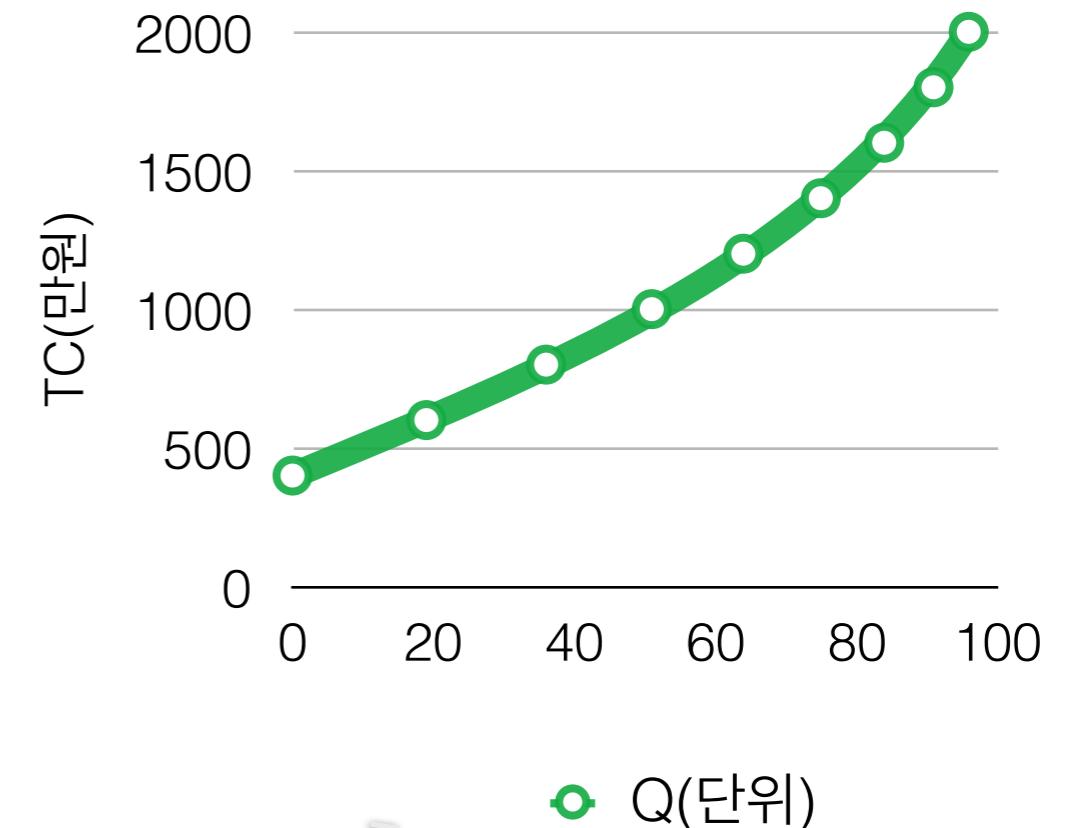


TC Cv. & TP Cv

TP Curve



TC Curve

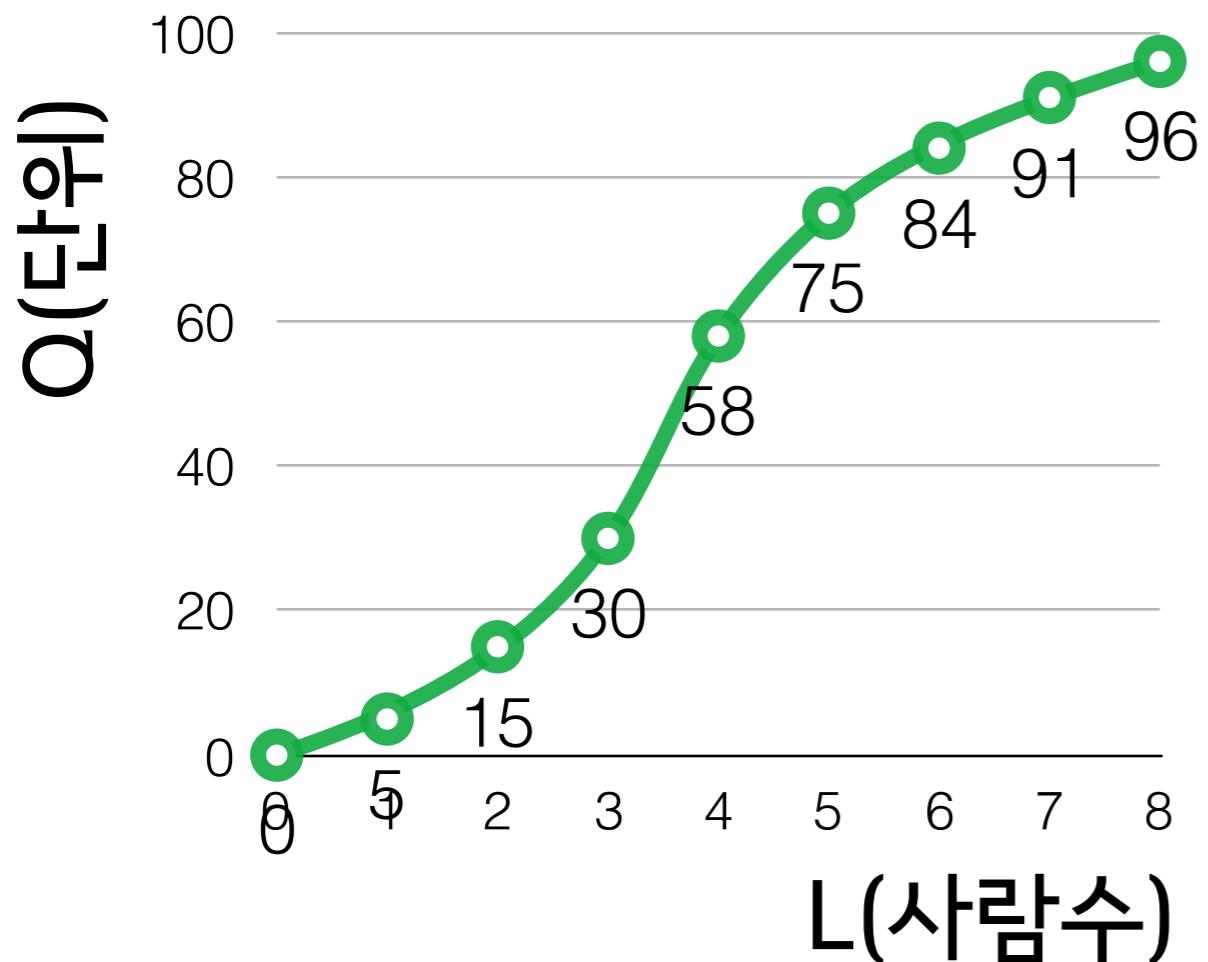


General TC Curve

General TC Curve

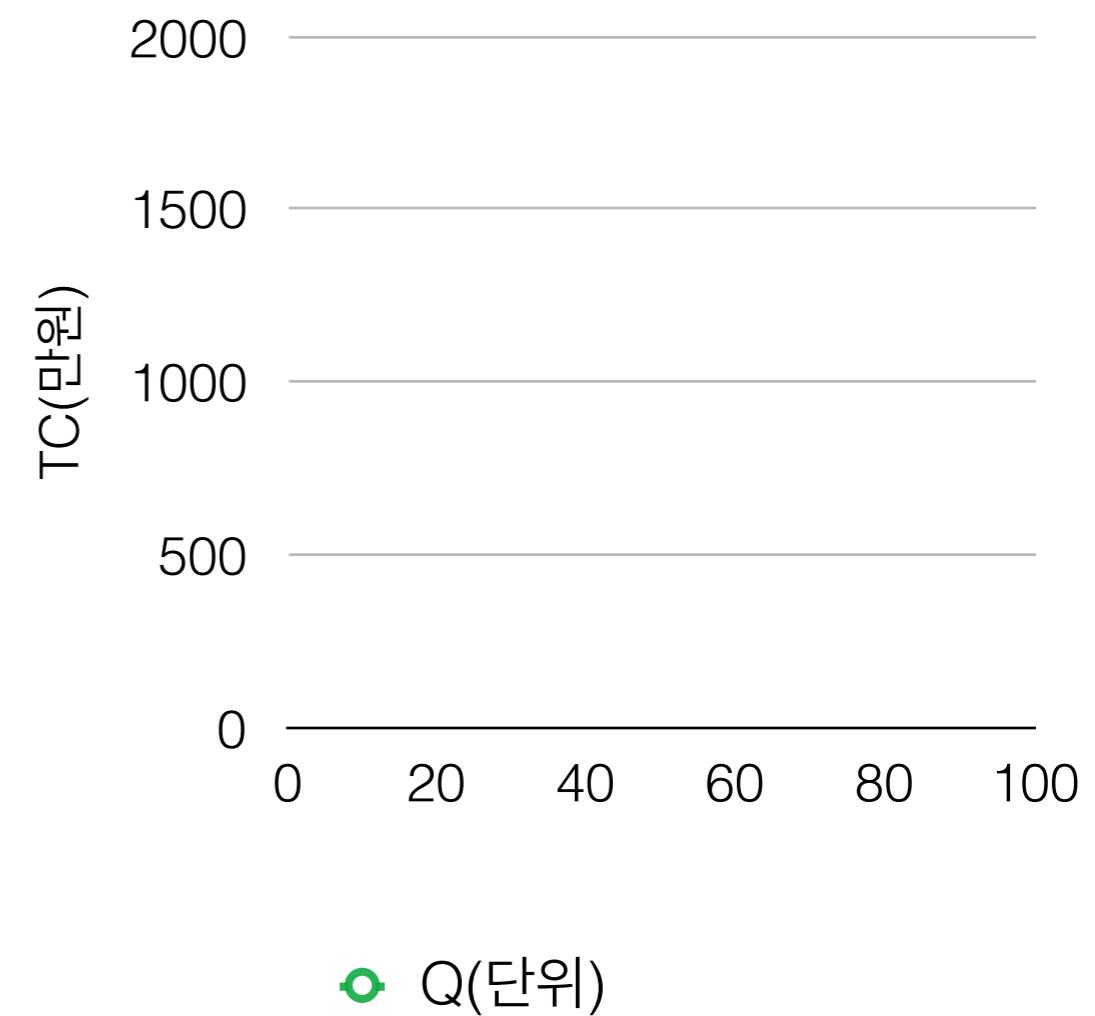
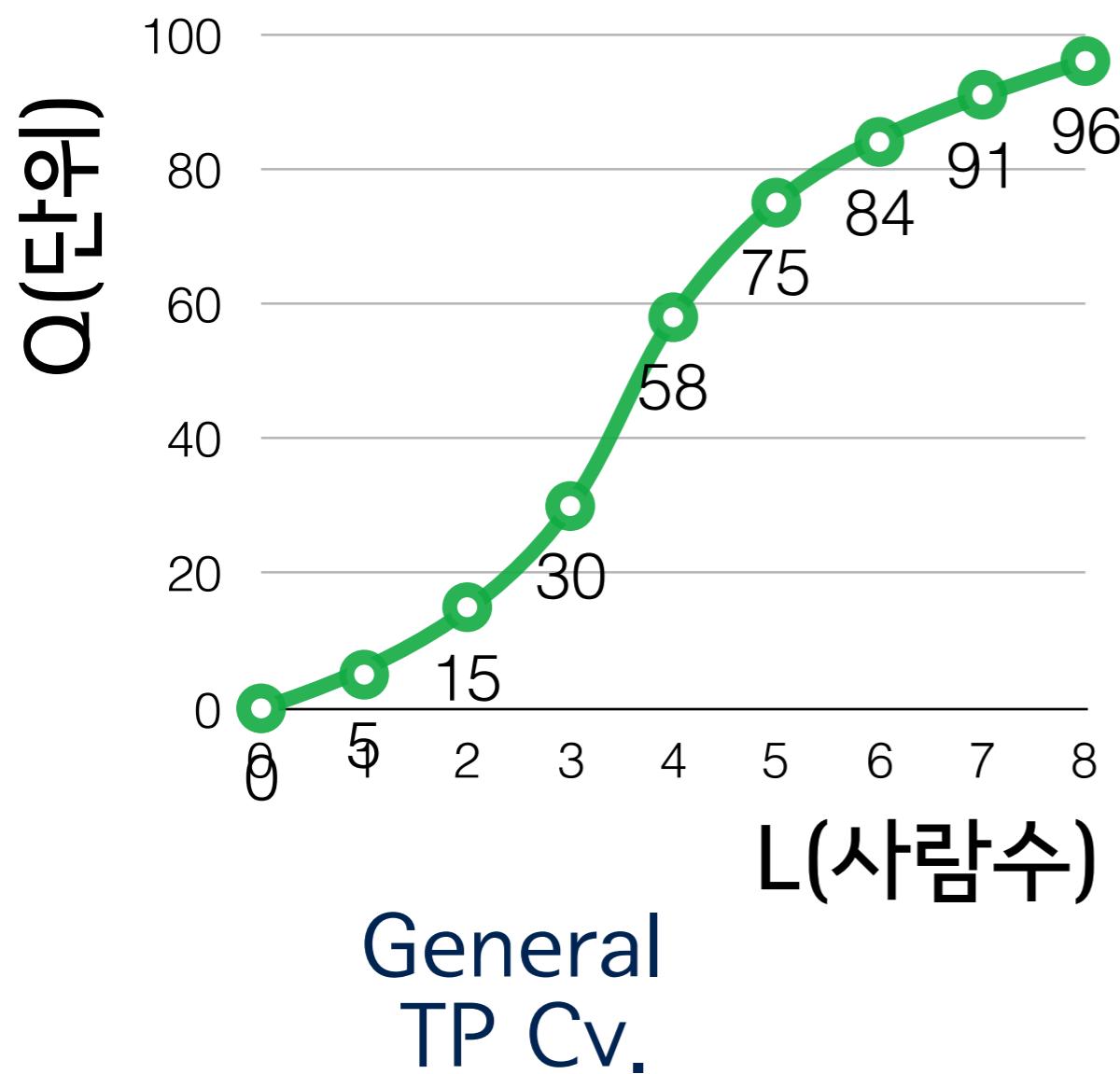


General TC Curve

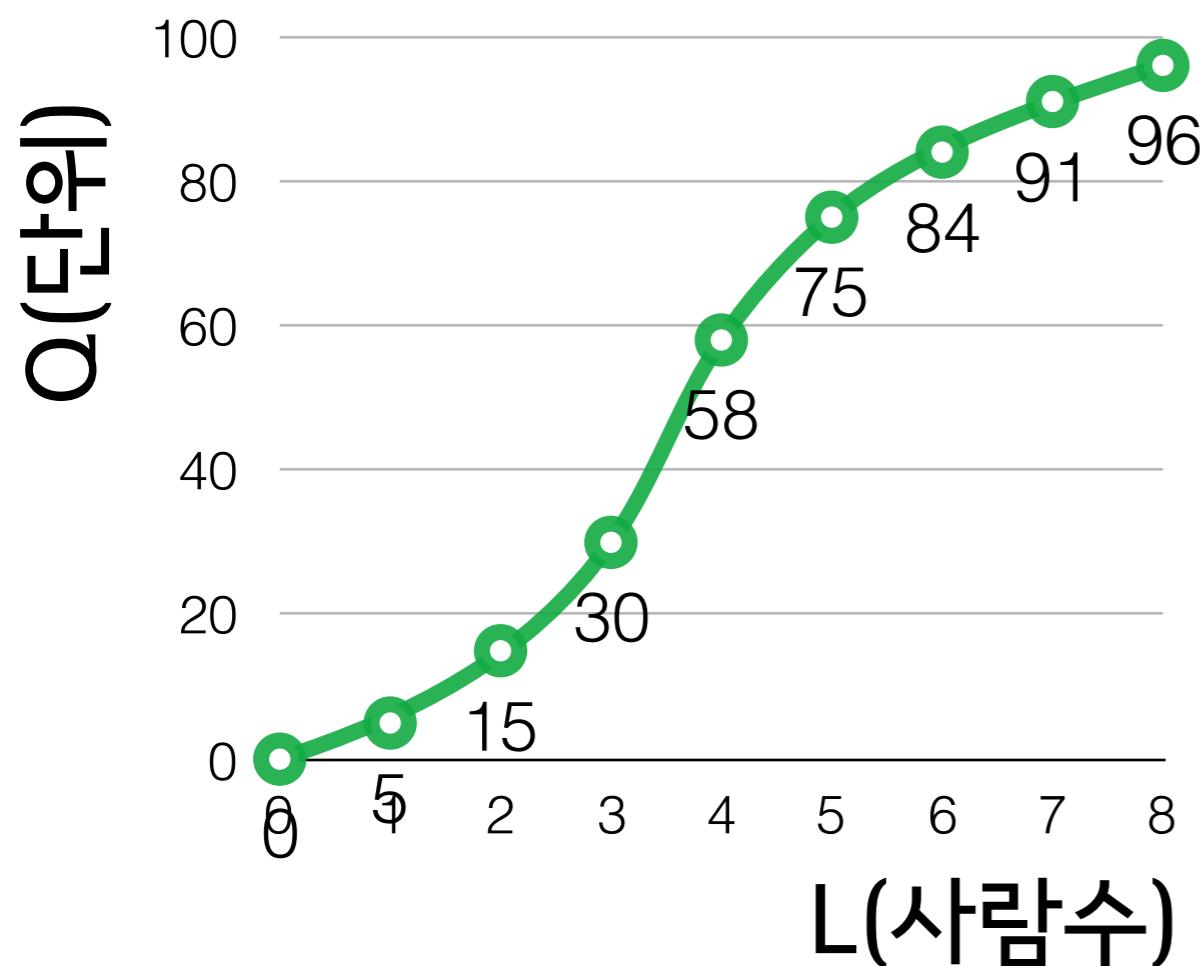


General
TP Cv.

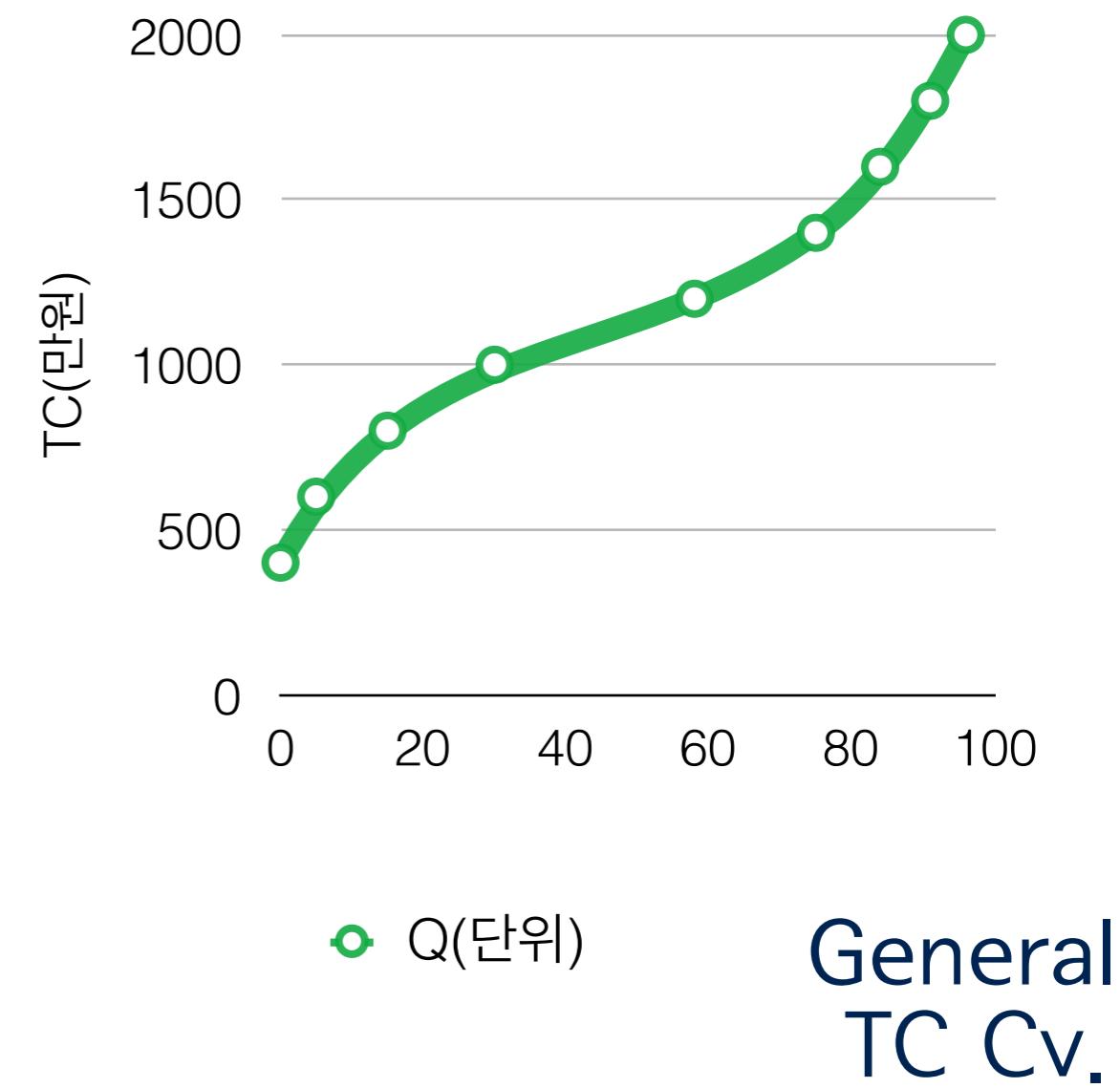
General TC Curve



General TC Curve



General
TP Cv.



General
TC Cv.

MC and AC

MC: Marginal Cost

$$MC \equiv \frac{\Delta TC}{\Delta Q} = \frac{dTC}{dQ}$$

- 한계비용: 상품 1단위를 추가 생산하는데 들어가는 추가적 비용
- TC곡선에서 가로축이 Q였으므로, MC의 정의는 TC곡선의 기울기의 정의와 완전히 동등

Calculating MC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)
0	0	0	400	400
1	19	200	400	600
2	36	400	400	800
3	51	600	400	1000
4	64	800	400	1200
5	75	1000	400	1400
6	84	1200	400	1600
7	91	1400	400	1800
8	96	1600	400	2000

Calculating MC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)
0	0	0	400	400	10.5
1	19	200	400	600	11.8
2	36	400	400	800	13.3
3	51	600	400	1000	15.4
4	64	800	400	1200	18.2
5	75	1000	400	1400	22.2
6	84	1200	400	1600	28.6
7	91	1400	400	1800	40.0
8	96	1600	400	2000	

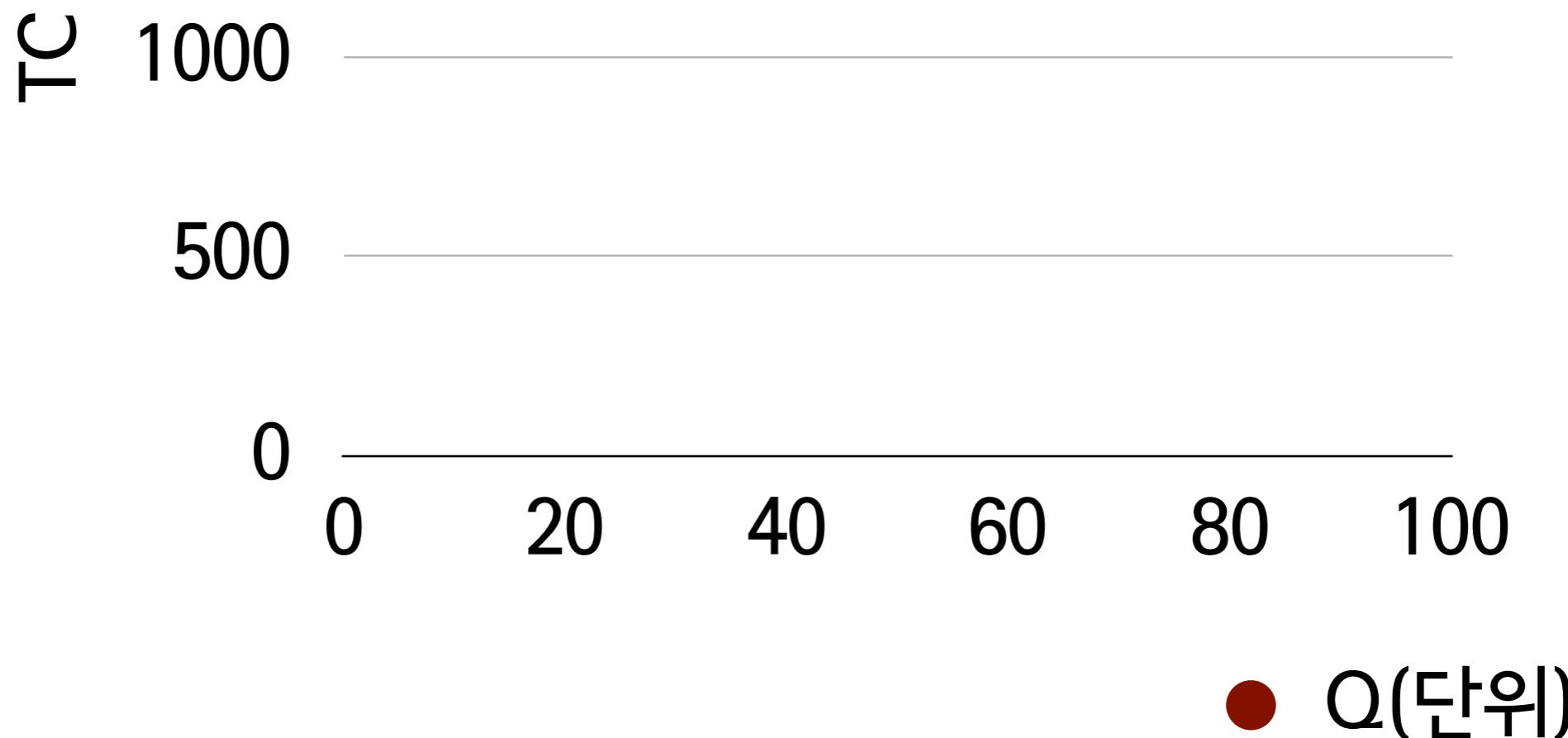
TC cv.

TC cv.

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/ 단위)
0	0	0	400	400	10.5
1	19	200	400	600	11.8
2	36	400	400	800	13.3
3	51	600	400	1000	15.4
4	64	800	400	1200	18.2
5	75	1000	400	1400	22.2
6	84	1200	400	1600	28.6
7	91	1400	400	1800	40.0
8	96	1600	400	2000	

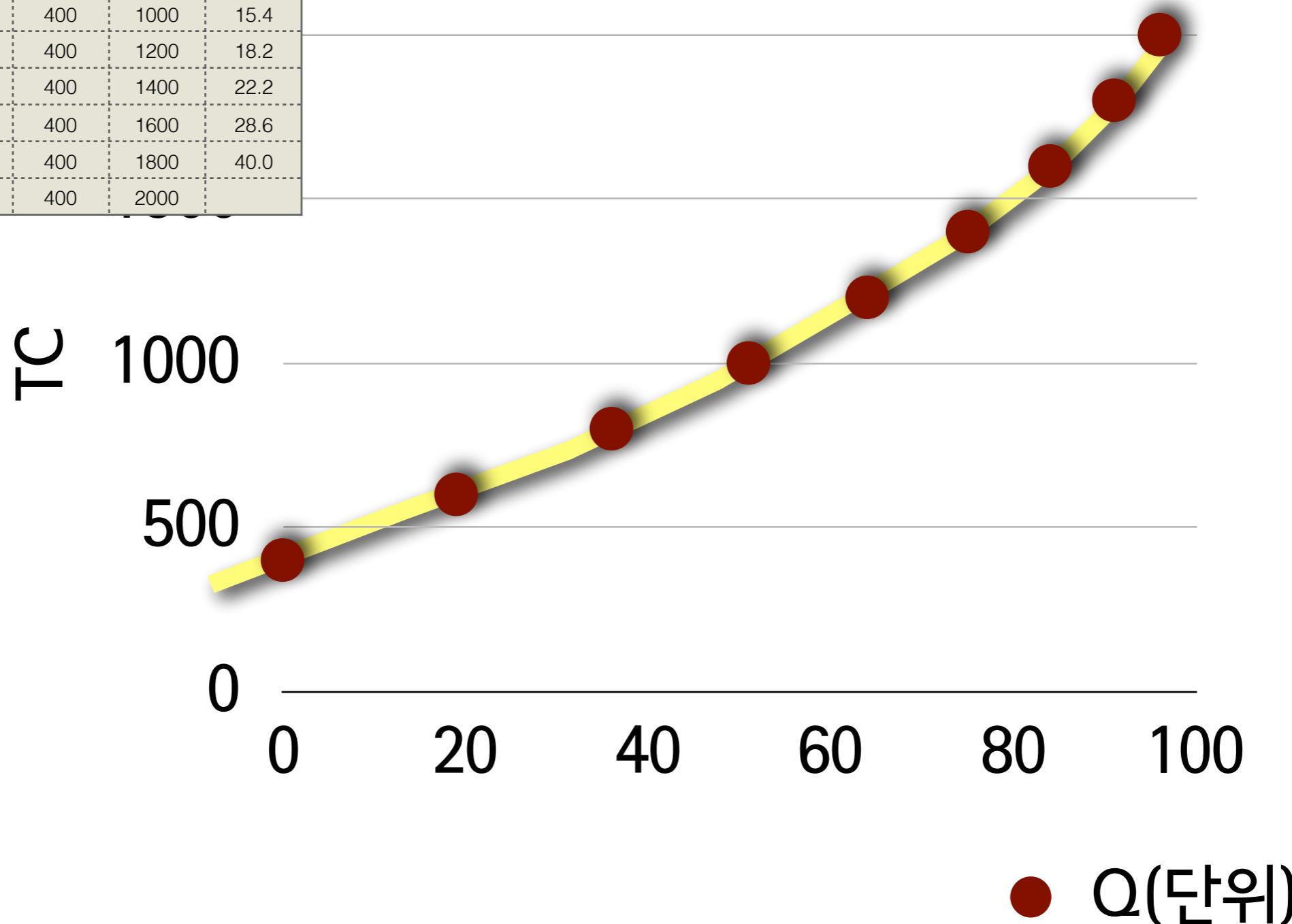
TC cv.

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/ 단위)
0	0	0	400	400	10.5
1	19	200	400	600	11.8
2	36	400	400	800	13.3
3	51	600	400	1000	15.4
4	64	800	400	1200	18.2
5	75	1000	400	1400	22.2
6	84	1200	400	1600	28.6
7	91	1400	400	1800	40.0
8	96	1600	400	2000	



TC cv.

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/ 단위)
0	0	0	400	400	10.5
1	19	200	400	600	11.8
2	36	400	400	800	13.3
3	51	600	400	1000	15.4
4	64	800	400	1200	18.2
5	75	1000	400	1400	22.2
6	84	1200	400	1600	28.6
7	91	1400	400	1800	40.0
8	96	1600	400	2000	



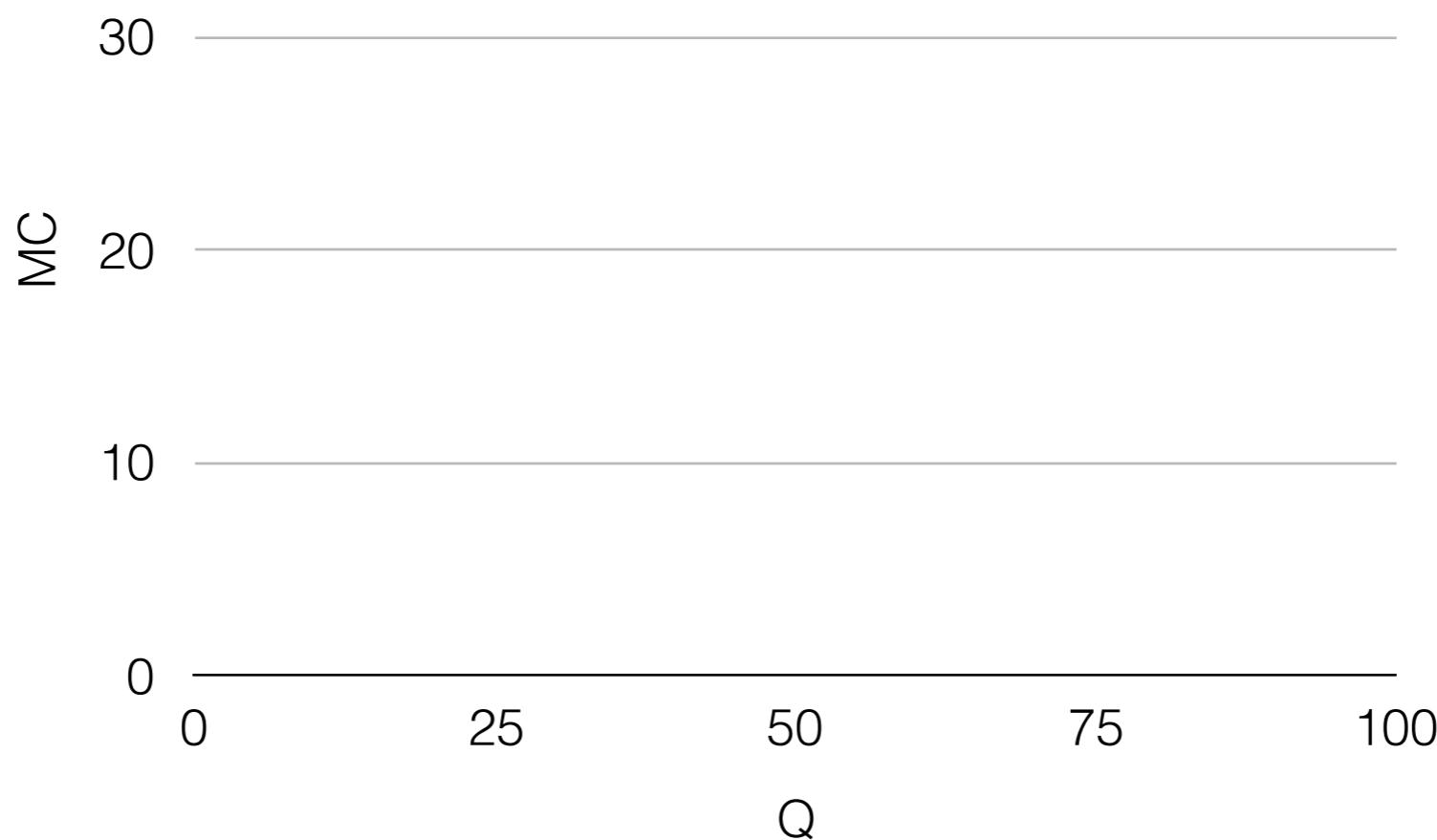
Drawing MC cv.

Drawing MC cv.

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)
0	0	0	400	400	10.5
1	19	200	400	600	11.8
2	36	400	400	800	13.3
3	51	600	400	1000	15.4
4	64	800	400	1200	18.2
5	75	1000	400	1400	22.2
6	84	1200	400	1600	28.6
7	91	1400	400	1800	40.0
8	96	1600	400	2000	

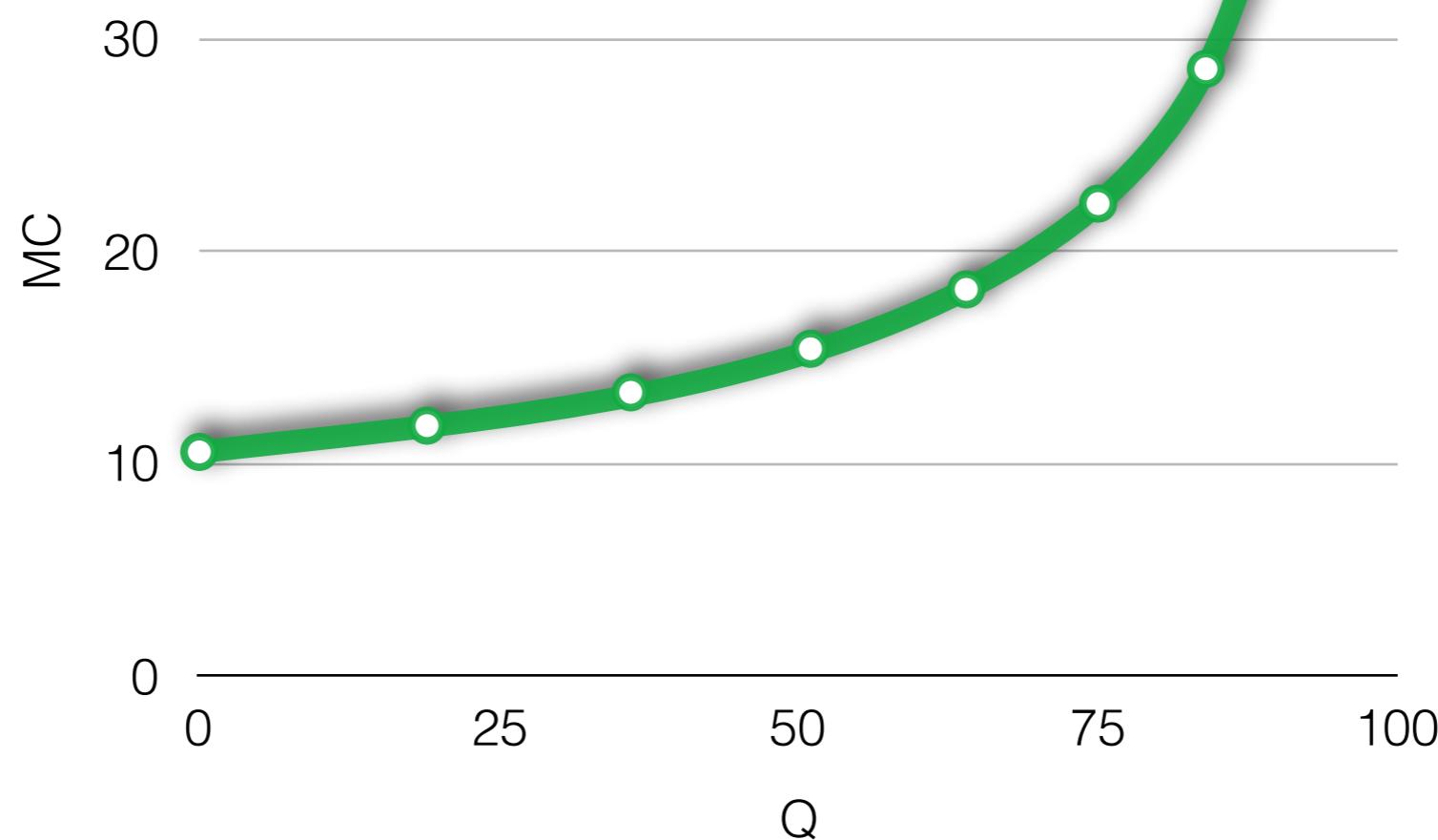
Drawing MC cv.

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)
0	0	0	400	400	10.5
1	19	200	400	600	11.8
2	36	400	400	800	13.3
3	51	600	400	1000	15.4
4	64	800	400	1200	18.2
5	75	1000	400	1400	22.2
6	84	1200	400	1600	28.6
7	91	1400	400	1800	40.0
8	96	1600	400	2000	



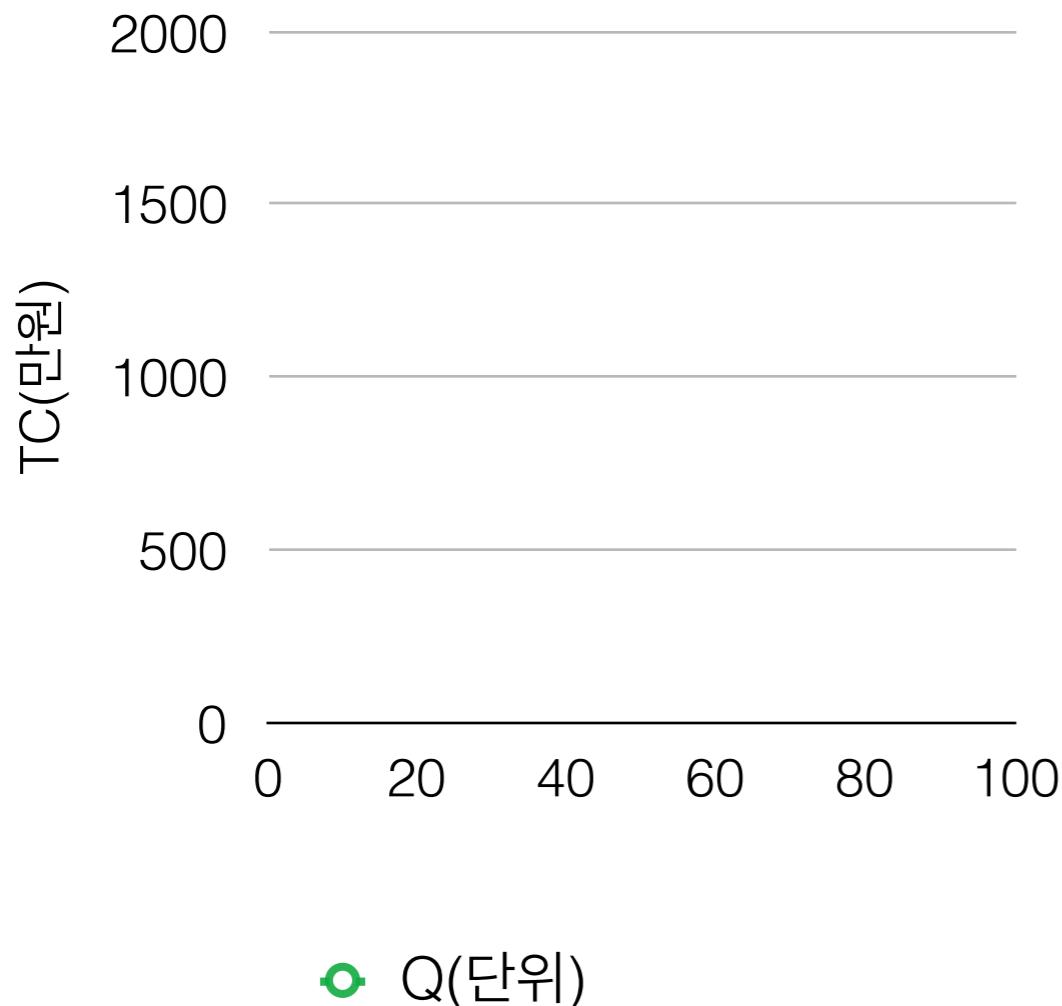
Drawing MC cv.

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)
0	0	0	400	400	10.5
1	19	200	400	600	11.8
2	36	400	400	800	13.3
3	51	600	400	1000	15.4
4	64	800	400	1200	18.2
5	75	1000	400	1400	22.2
6	84	1200	400	1600	28.6
7	91	1400	400	1800	40.0
8	96	1600	400	2000	

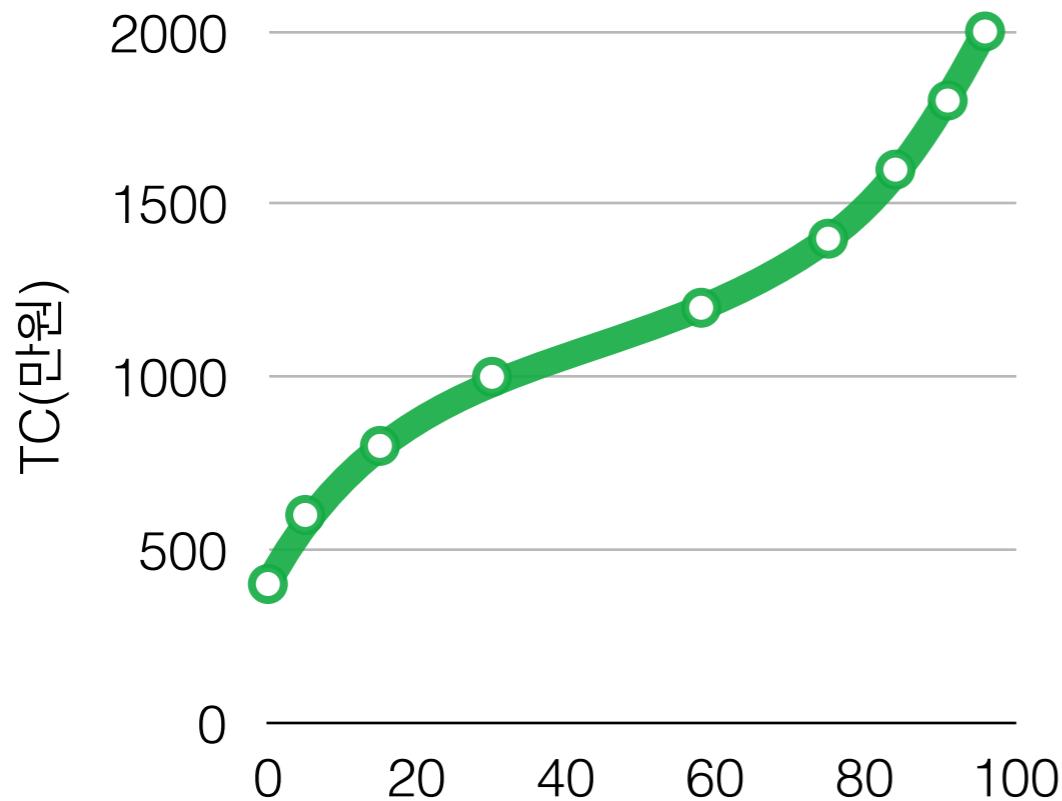


General MC Cv: U-Shape

General MC Cv: U-Shape



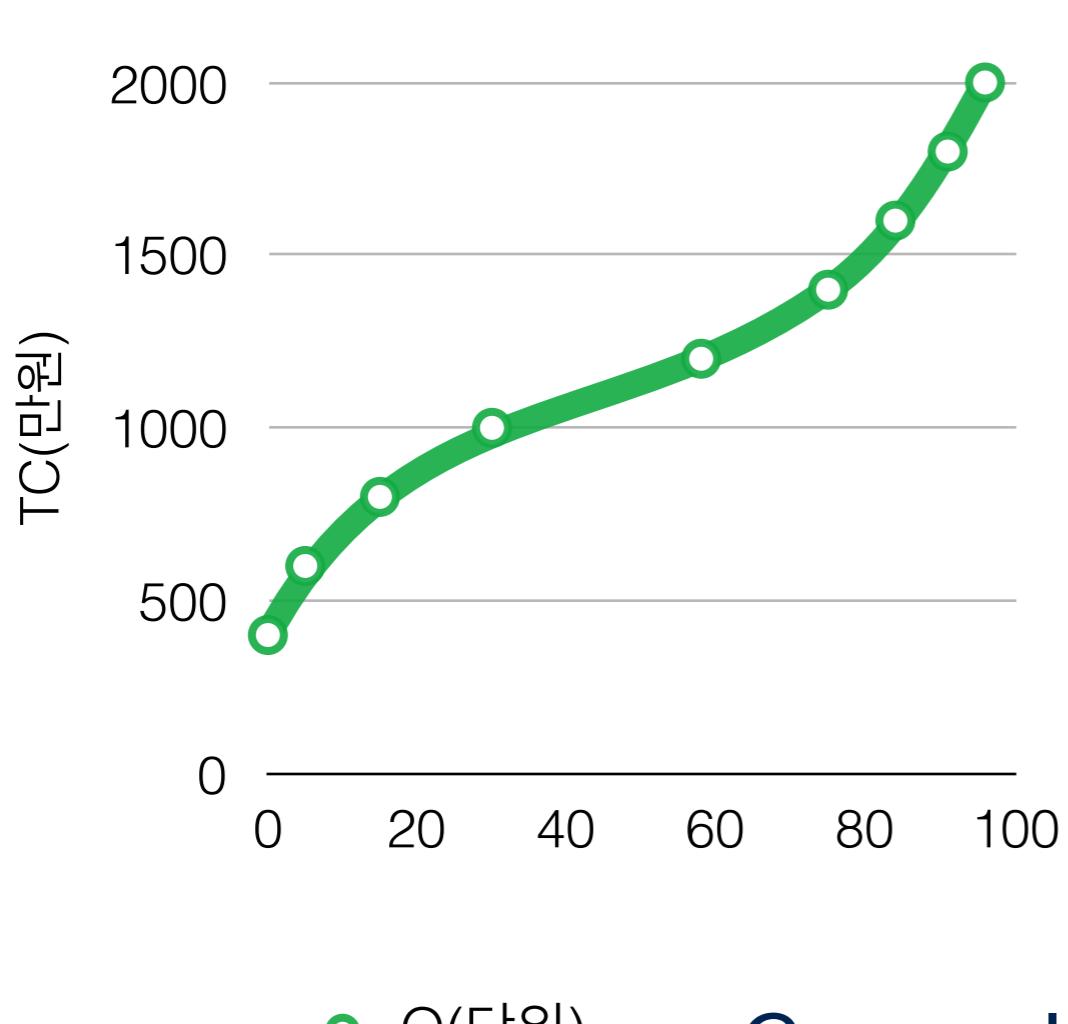
General MC Cv: U-Shape



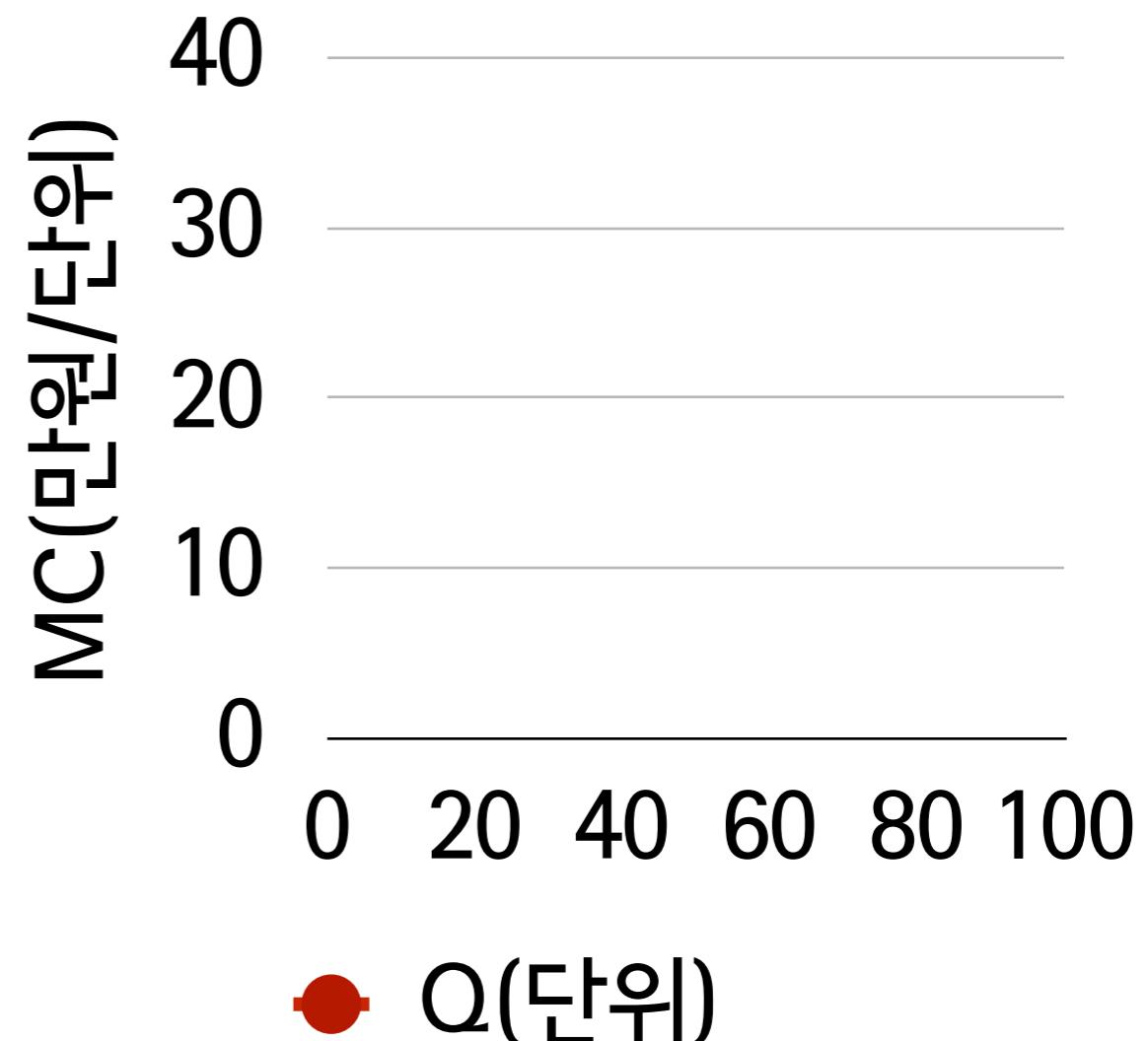
● Q(단위)

General
TC Cv.

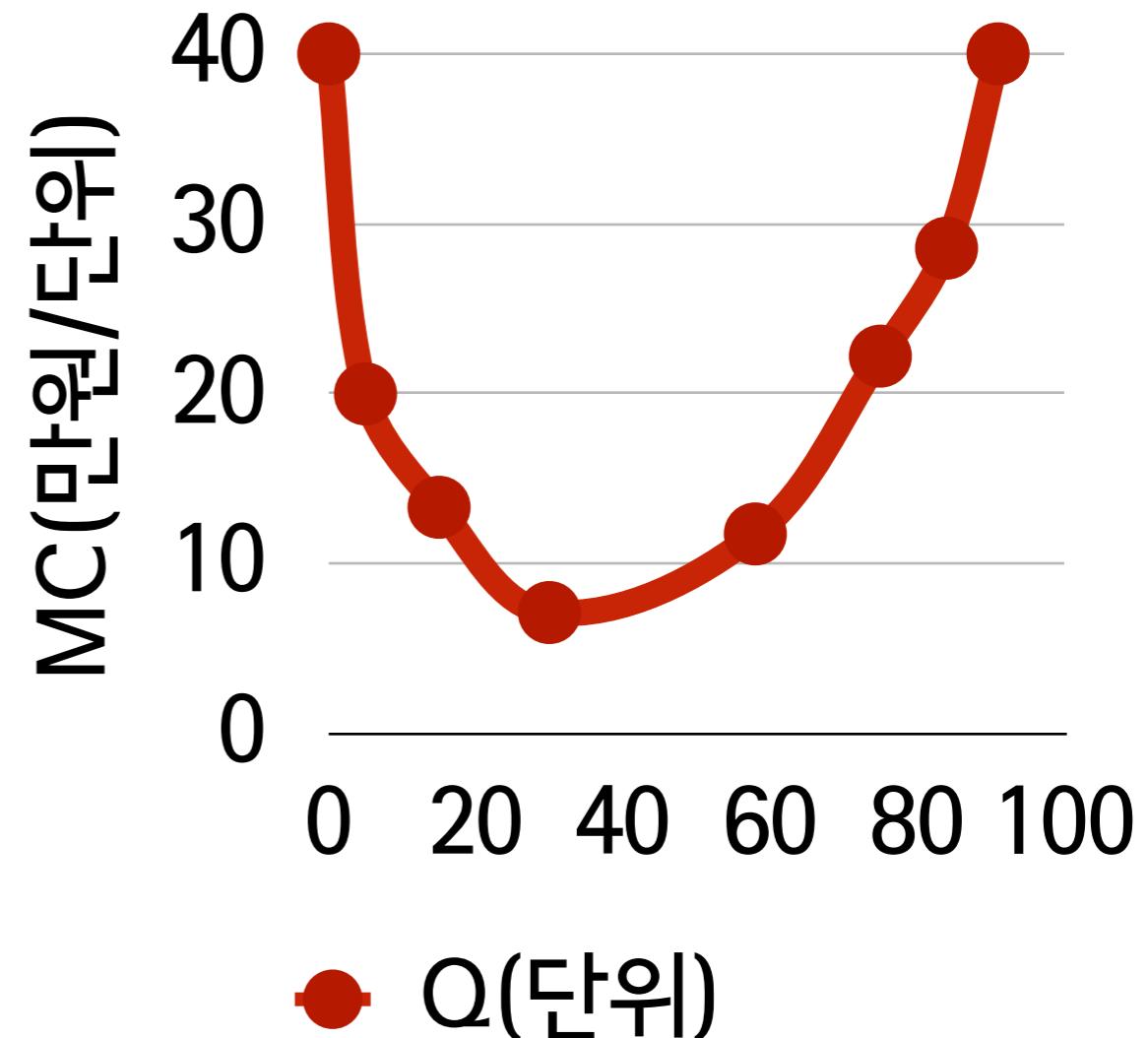
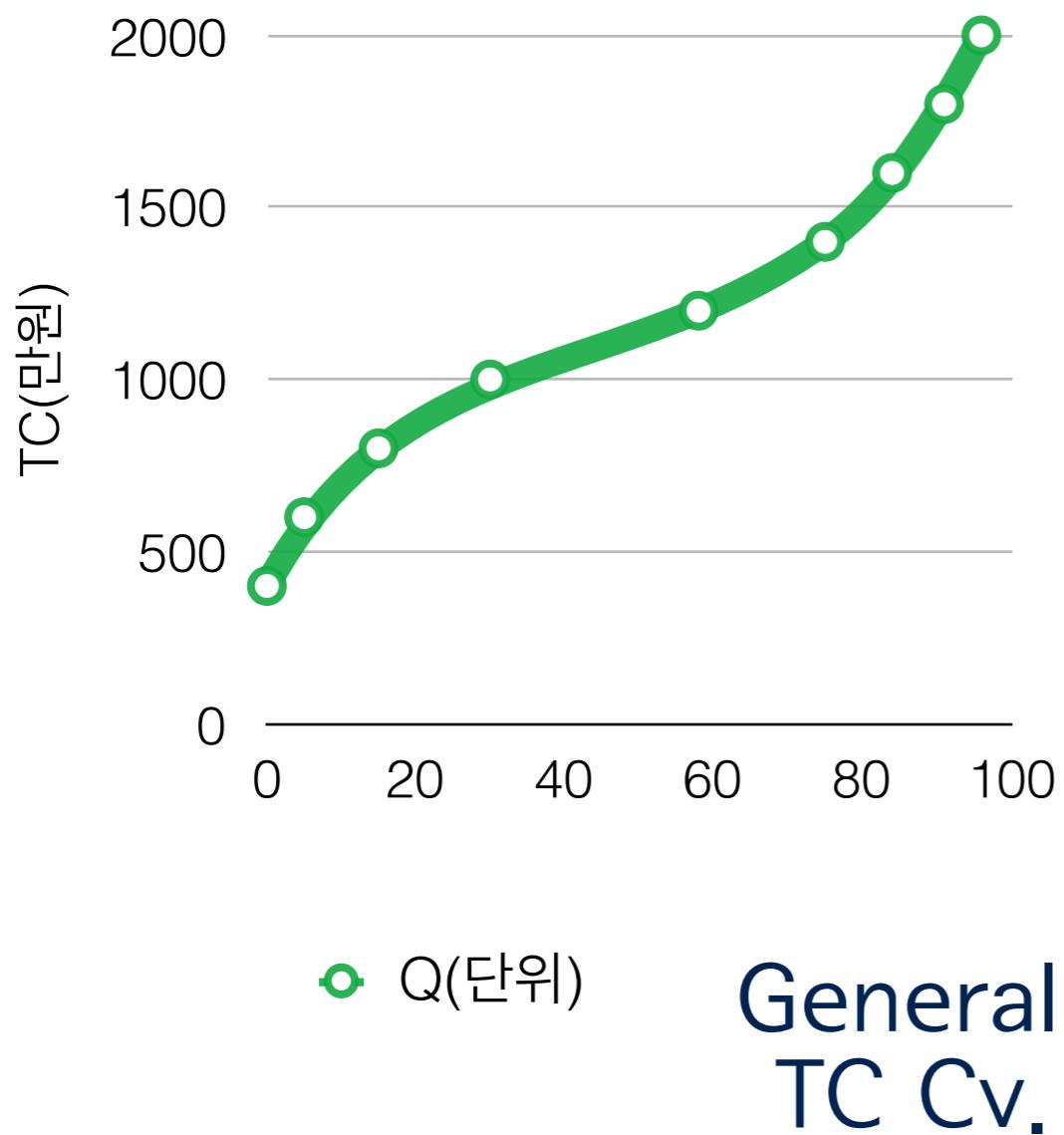
General MC Cv: U-Shape



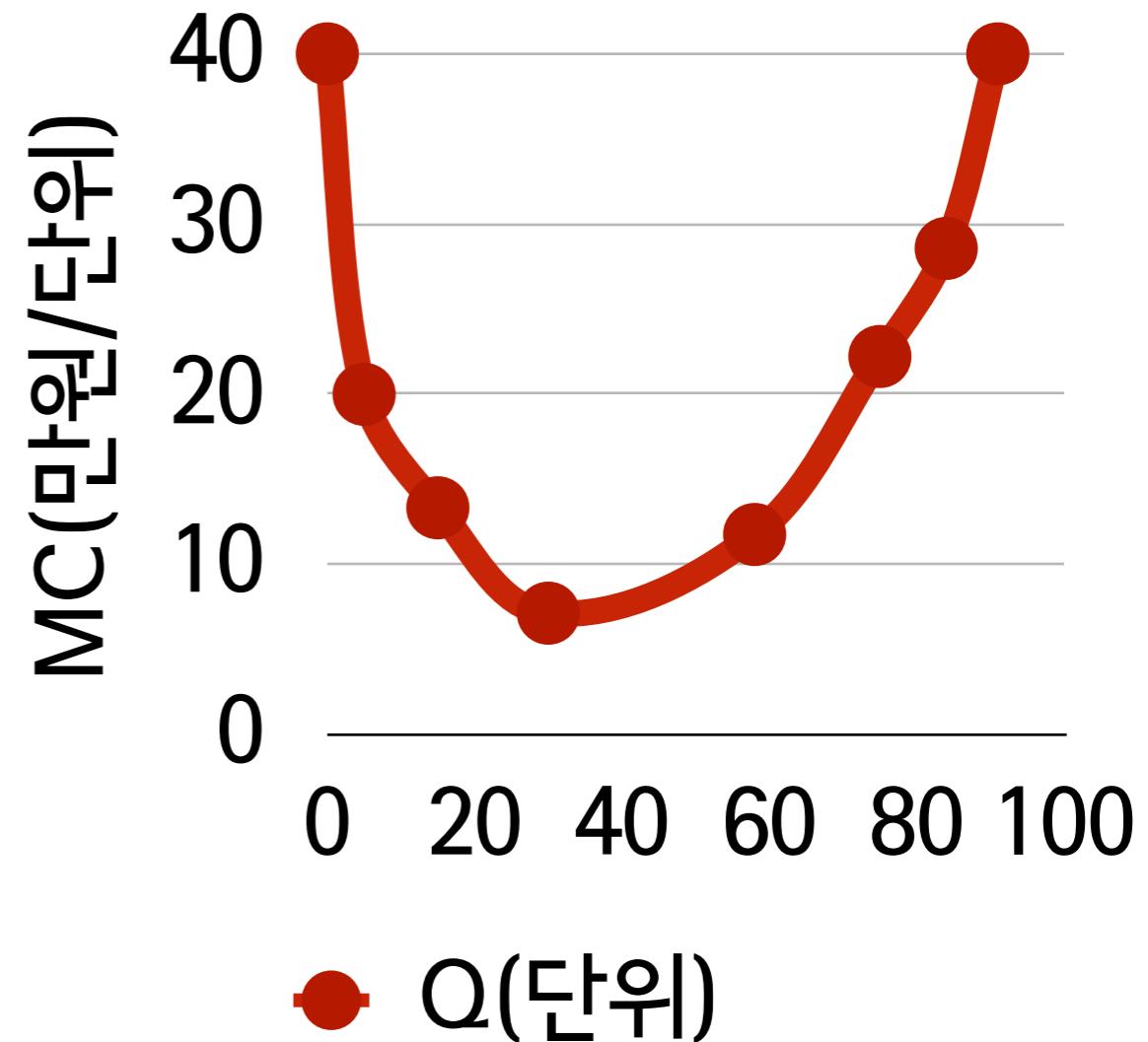
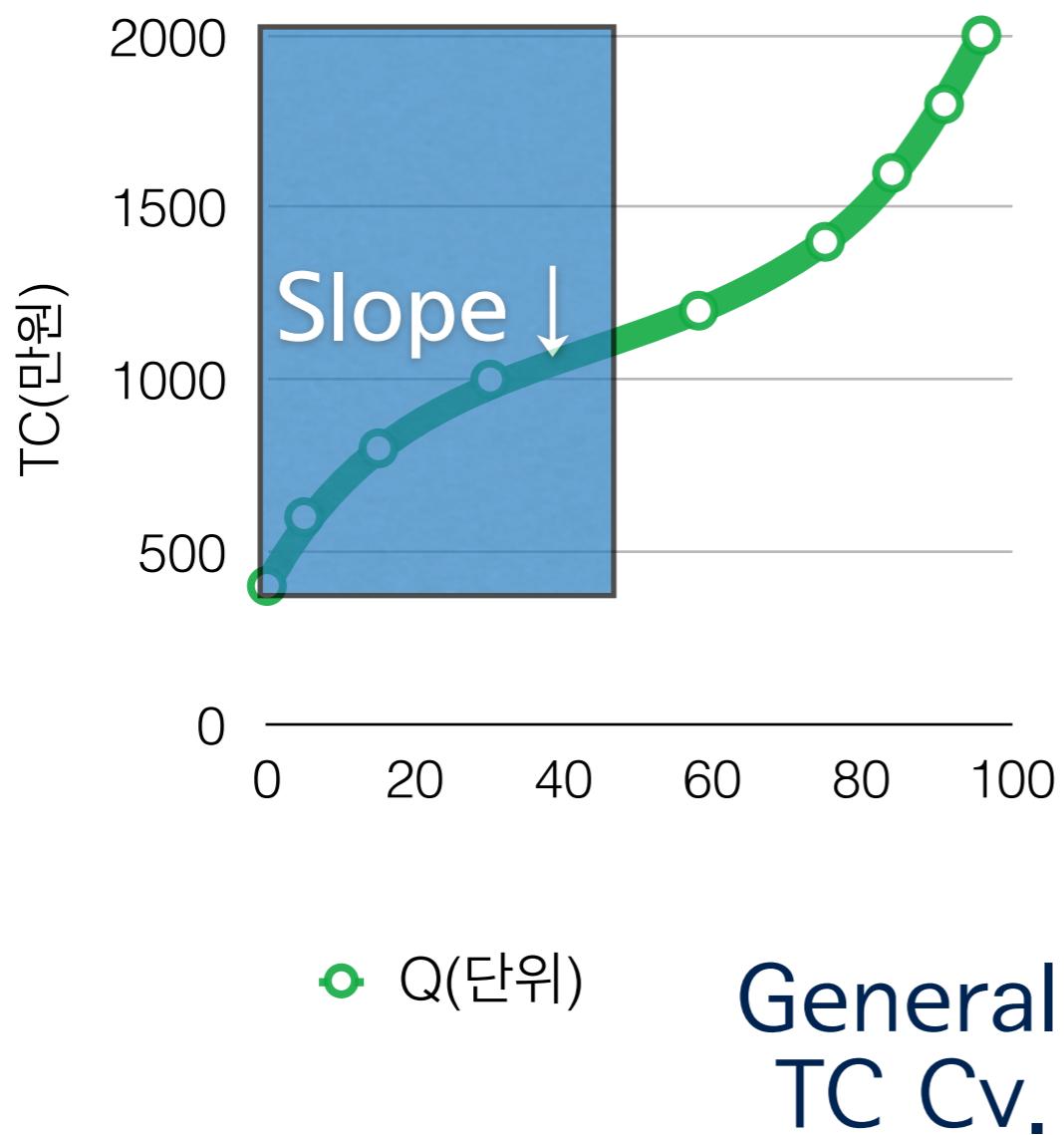
General
TC Cv.



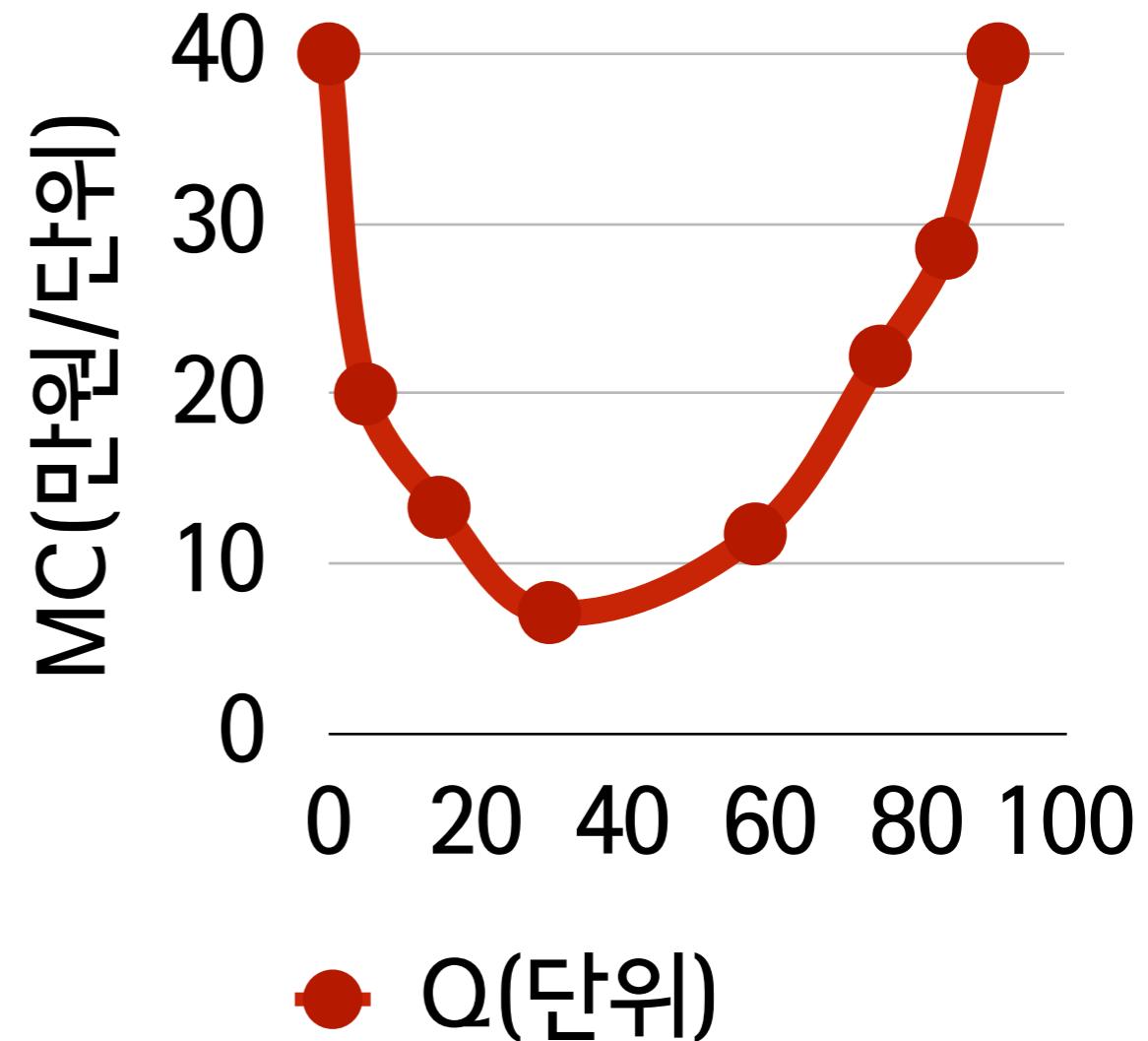
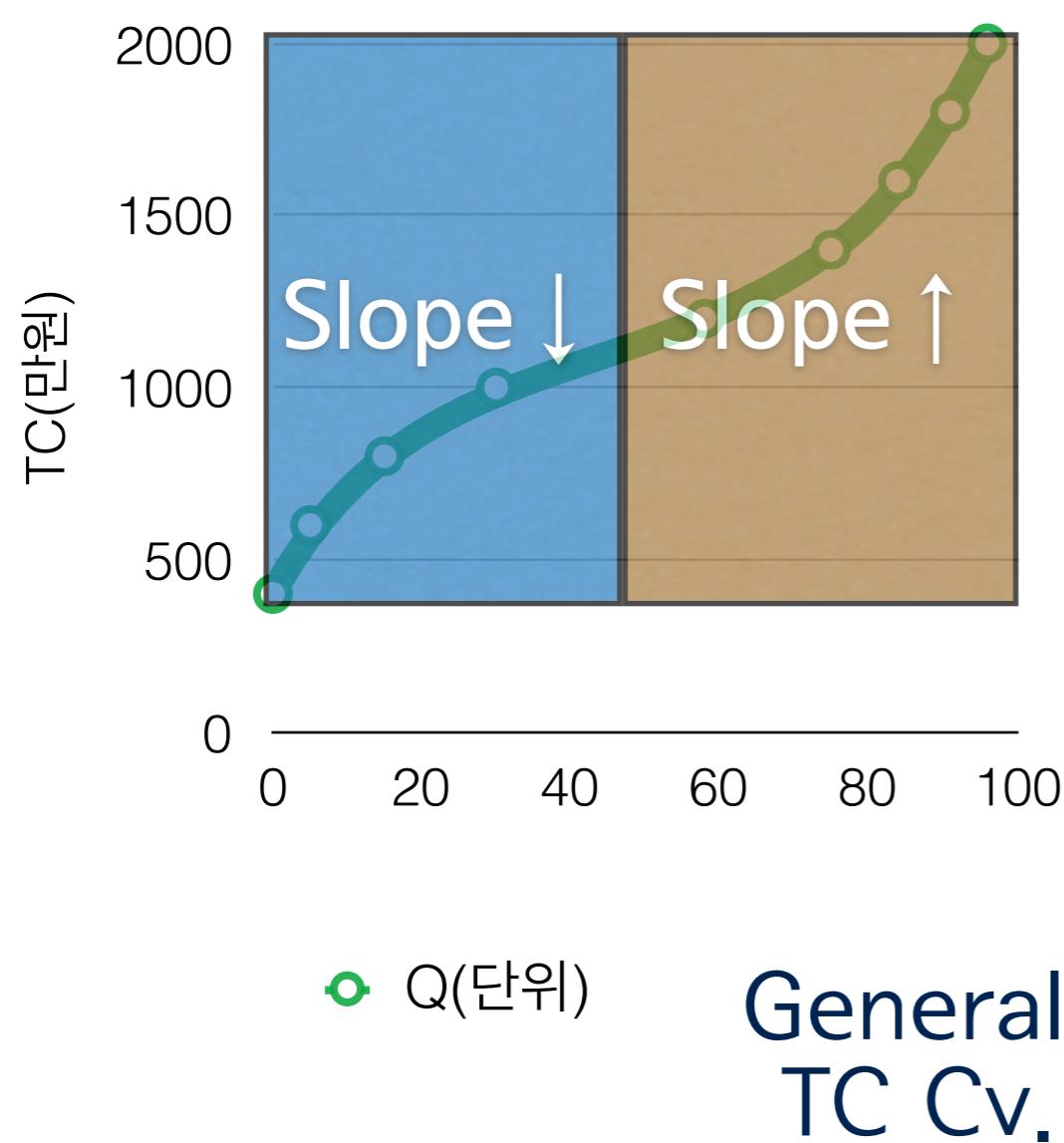
General MC Cv: U-Shape



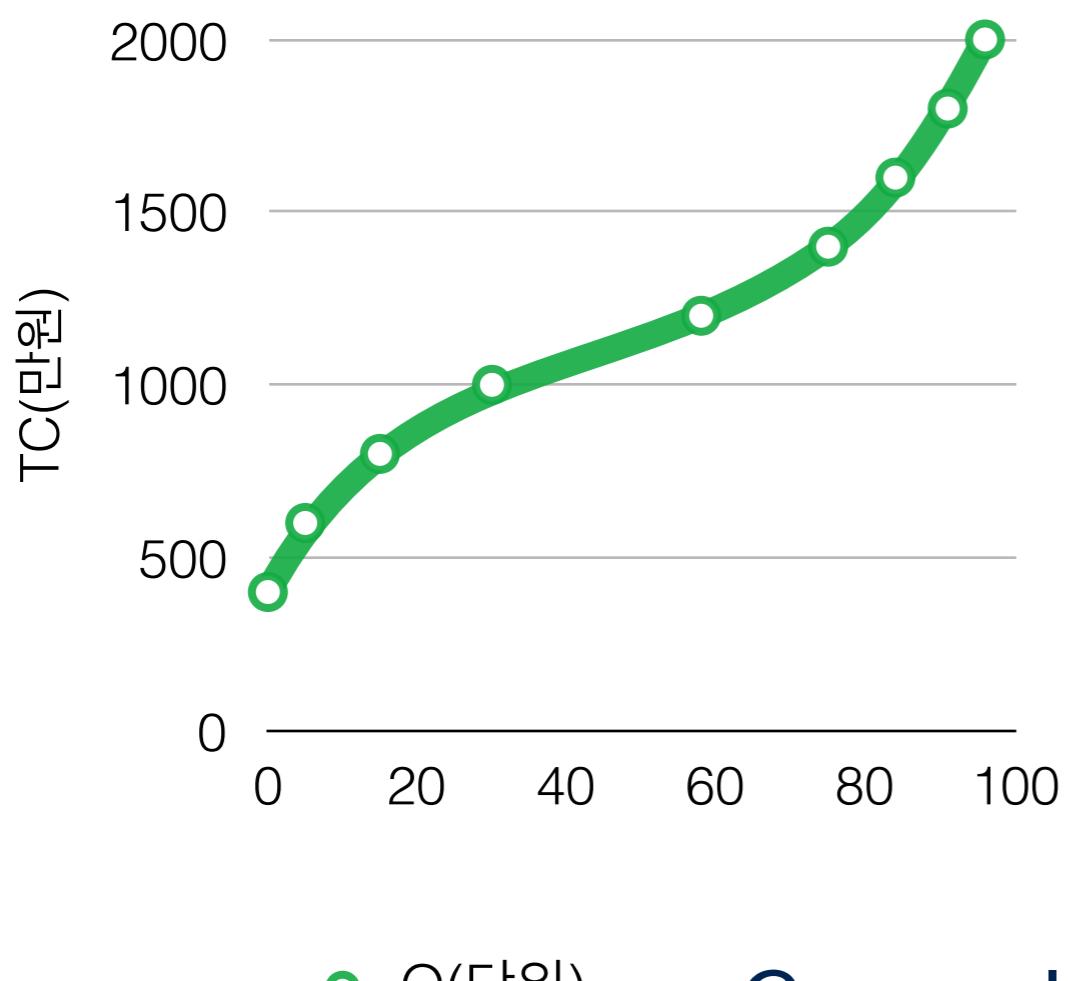
General MC Cv: U-Shape



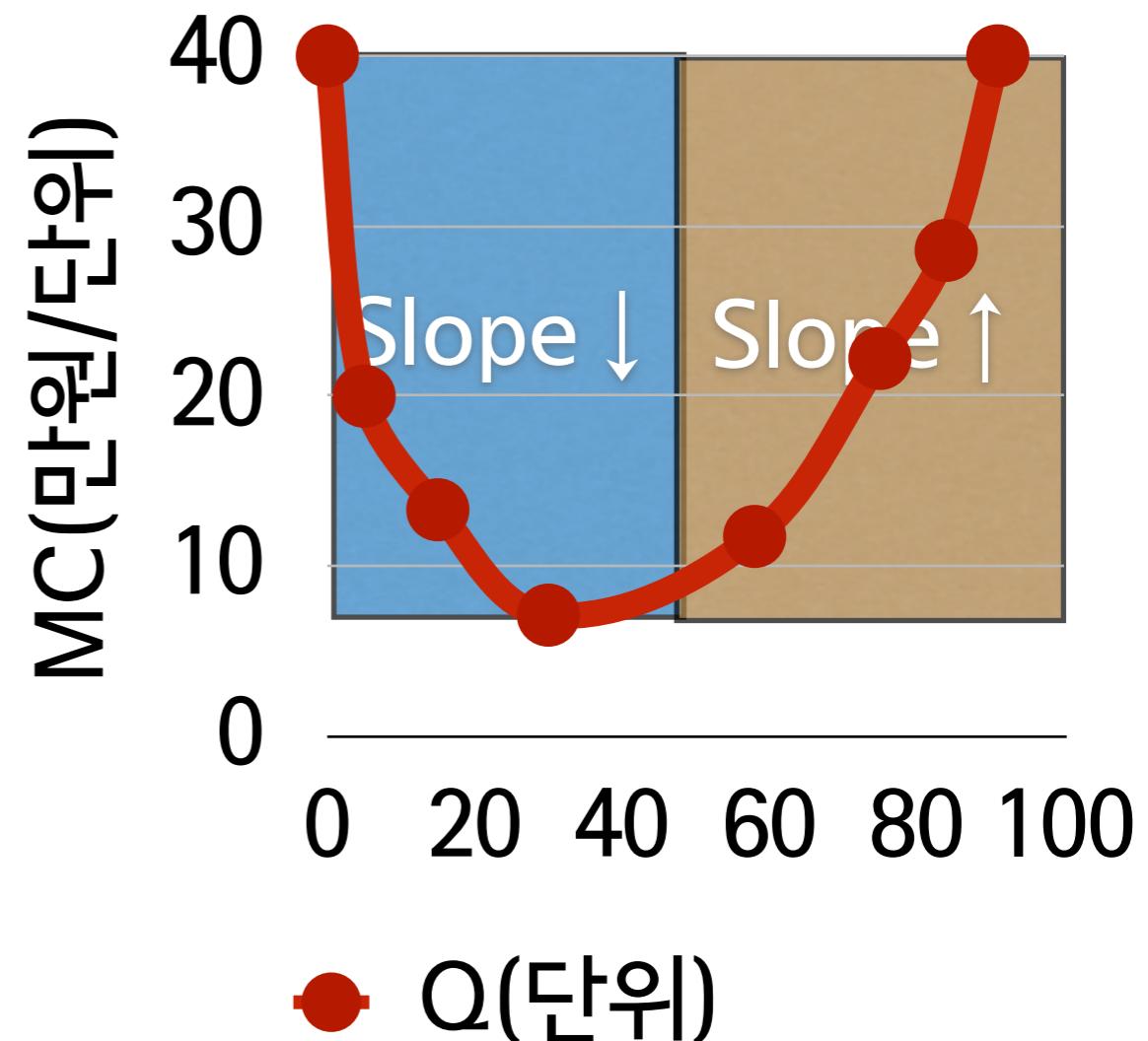
General MC Cv: U-Shape



General MC Cv: U-Shape



General
TC Cv.



AC: Average Cost

$$AC \equiv \frac{TC}{Q}$$

- 평균비용: 산출량 1단위당 들어간 비용
- cf. MC

$$MC \equiv \frac{\Delta TC}{\Delta Q}$$

Calculating AC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)		
0	0	0	400	400		
1	19	200	400	600		
2	36	400	400	800		
3	51	600	400	1000		
4	64	800	400	1200		
5	75	1000	400	1400		
6	84	1200	400	1600		
7	91	1400	400	1800		
8	96	1600	400	2000		

Calculating AC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)	
0	0	0	400	400	10.5	
1	19	200	400	600	11.8	
2	36	400	400	800	13.3	
3	51	600	400	1000	15.4	
4	64	800	400	1200	18.2	
5	75	1000	400	1400	22.2	
6	84	1200	400	1600	28.6	
7	91	1400	400	1800	40.0	
8	96	1600	400	2000		

Calculating AC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)	AC(만원/단위)
0	0	0	400	400	10.5	∞
1	19	200	400	600	11.8	31.6
2	36	400	400	800	13.3	22.2
3	51	600	400	1000	15.4	19.6
4	64	800	400	1200	18.2	18.8
5	75	1000	400	1400	22.2	18.7
6	84	1200	400	1600	28.6	19.0
7	91	1400	400	1800	40.0	19.8
8	96	1600	400	2000		20.8

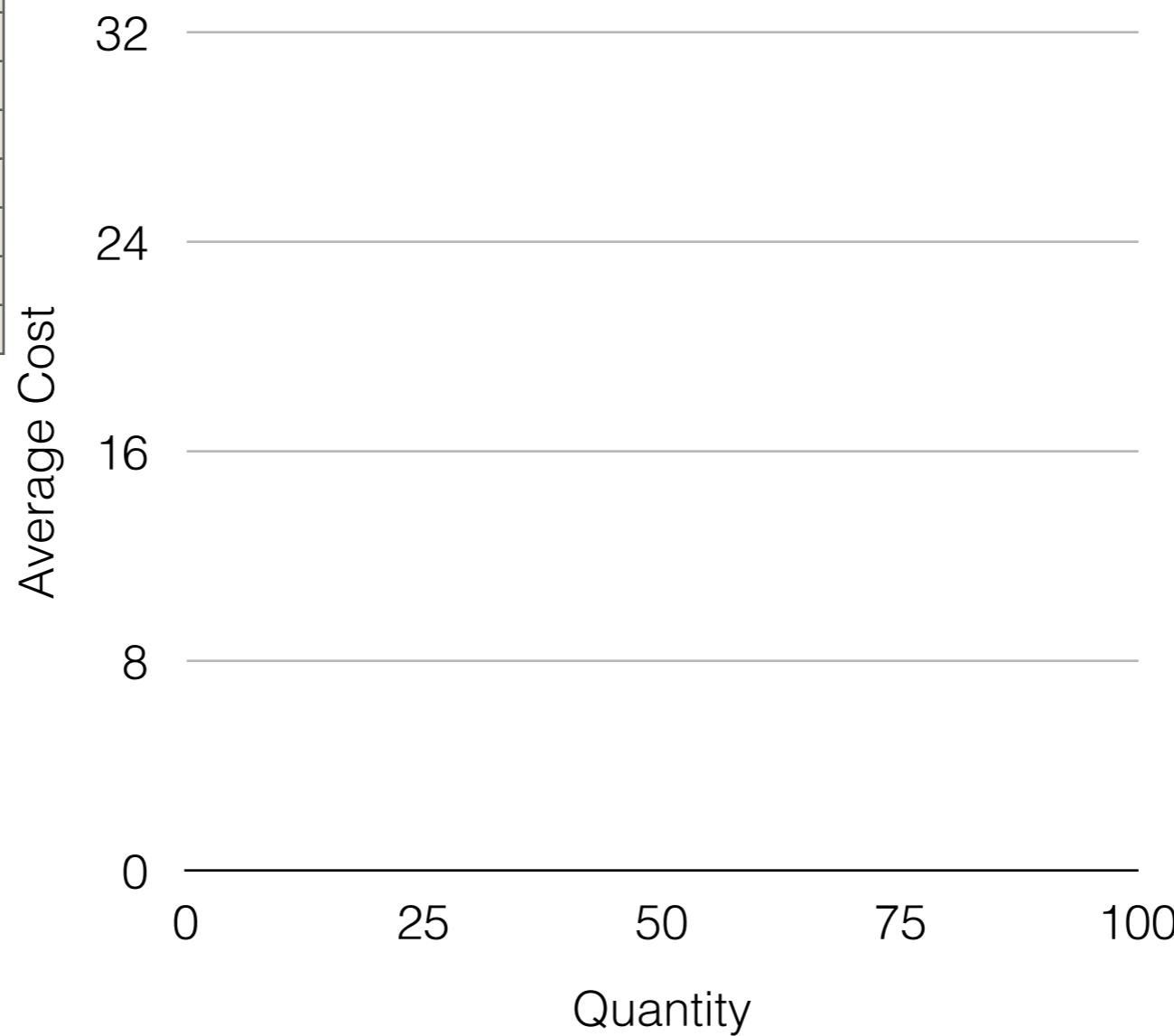
AC curve

AC curve

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)	AC(만원/단위)
0	0	0	400	400	10.5	∞
1	19	200	400	600	11.8	31.6
2	36	400	400	800	13.3	22.2
3	51	600	400	1000	15.4	19.6
4	64	800	400	1200	18.2	18.8
5	75	1000	400	1400	22.2	18.7
6	84	1200	400	1600	28.6	19.0
7	91	1400	400	1800	40.0	19.8
8	96	1600	400	2000		20.8

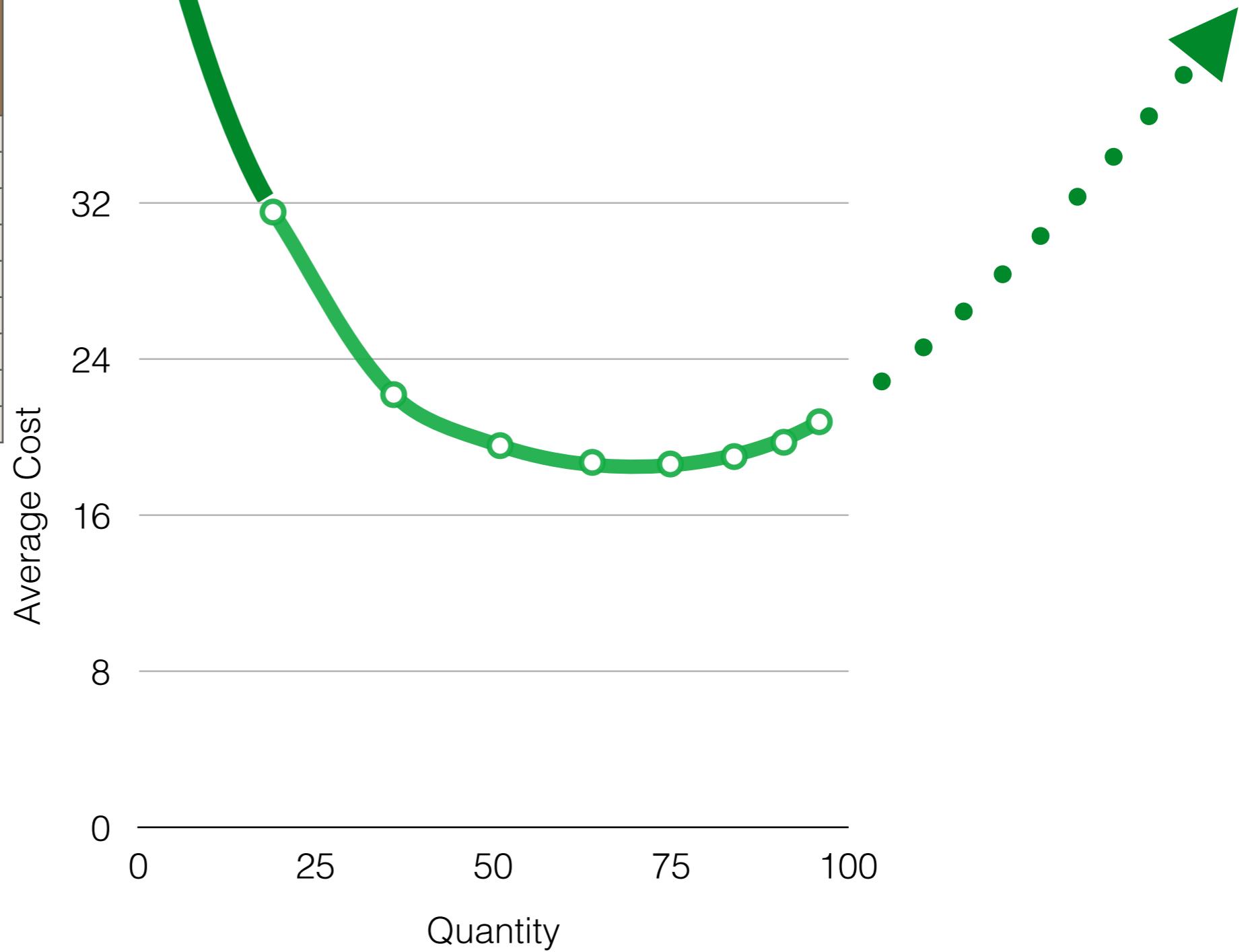
AC curve

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)	AC(만원/단위)
0	0	0	400	400	10.5	∞
1	19	200	400	600	11.8	31.6
2	36	400	400	800	13.3	22.2
3	51	600	400	1000	15.4	19.6
4	64	800	400	1200	18.2	18.8
5	75	1000	400	1400	22.2	18.7
6	84	1200	400	1600	28.6	19.0
7	91	1400	400	1800	40.0	19.8
8	96	1600	400	2000		20.8



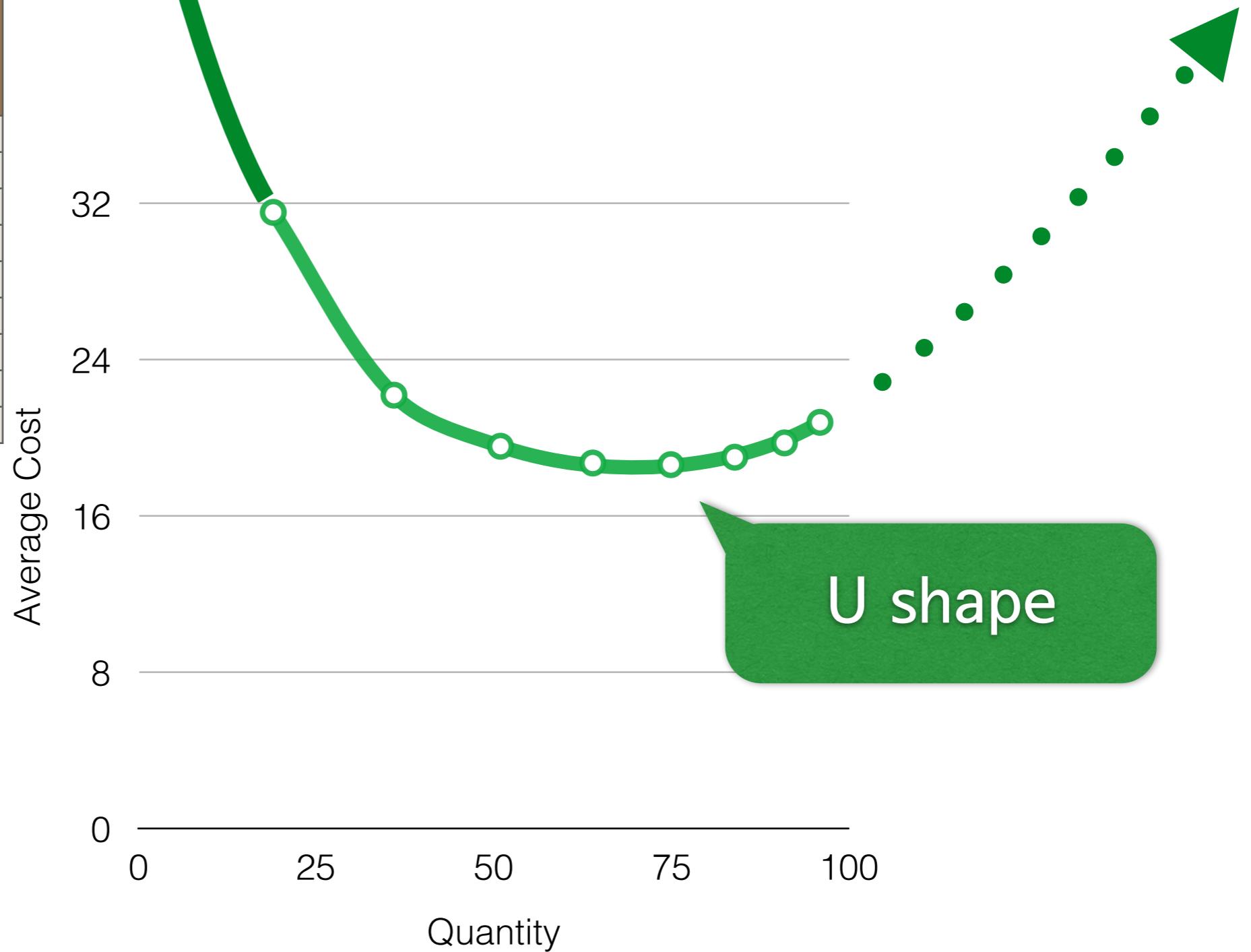
AC curve

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)	AC(만원/단위)
0	0	0	400	400	10.5	∞
1	19	200	400	600	11.8	31.6
2	36	400	400	800	13.3	22.2
3	51	600	400	1000	15.4	19.6
4	64	800	400	1200	18.2	18.8
5	75	1000	400	1400	22.2	18.7
6	84	1200	400	1600	28.6	19.0
7	91	1400	400	1800	40.0	19.8
8	96	1600	400	2000		20.8



AC curve

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)	AC(만원/단위)
0	0	0	400	400	10.5	∞
1	19	200	400	600	11.8	31.6
2	36	400	400	800	13.3	22.2
3	51	600	400	1000	15.4	19.6
4	64	800	400	1200	18.2	18.8
5	75	1000	400	1400	22.2	18.7
6	84	1200	400	1600	28.6	19.0
7	91	1400	400	1800	40.0	19.8
8	96	1600	400	2000		20.8



Why is AC U-shaped?

- 고정비용(고정자본의 비용: 공장부지의 임대료 등)의 존재 때문
- 분산효과: 생산량이 많을수록 고정비용의 부담이 줄어든다: 초반의 AC곡선 하향
- 수익체감효과: 생산량이 많을수록 가변비용의 부담이 늘어난다: 후반의 AC곡선 상향

AFC, AVC

Average Fixed Cost

Fixed Cost

$$AFC$$

$$\equiv \frac{TFC}{Q}$$

$$TFC + TVC = TC$$

$$AFC + AVC = AC$$

$$AVC$$

$$\equiv \frac{TVC}{Q}$$

Average Variable Cost

Total Variable Cost

Calculating AFC, AVC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/ 단위)			
0	0	0	400	400	10.5			
1	19	200	400	600	11.8			
2	36	400	400	800	13.3			
3	51	600	400	1000	15.4			
4	64	800	400	1200	18.2			
5	75	1000	400	1400	22.2			
6	84	1200	400	1600	28.6			
7	91	1400	400	1800	40.0			
8	96	1600	400	2000				

Calculating AFC, AVC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/ 단위)	AC(만원/ 단위)		
0	0	0	400	400	10.5	∞		
1	19	200	400	600	11.8	31.6		
2	36	400	400	800	13.3	22.2		
3	51	600	400	1000	15.4	19.6		
4	64	800	400	1200	18.2	18.8		
5	75	1000	400	1400	22.2	18.7		
6	84	1200	400	1600	28.6	19.0		
7	91	1400	400	1800	40.0	19.8		
8	96	1600	400	2000		20.8		

Calculating AFC, AVC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/ 단위)	AC(만원/ 단위)	AFC	
0	0	0	400	400	10.5	∞	∞	
1	19	200	400	600	11.8	31.6	21.1	
2	36	400	400	800	13.3	22.2	11.1	
3	51	600	400	1000	15.4	19.6	7.8	
4	64	800	400	1200	18.2	18.8	6.3	
5	75	1000	400	1400	22.2	18.7	5.3	
6	84	1200	400	1600	28.6	19.0	4.8	
7	91	1400	400	1800	40.0	19.8	4.4	
8	96	1600	400	2000		20.8	4.2	

Calculating AFC, AVC

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/ 단위)	AC(만원/ 단위)	AFC	AVC
0	0	0	400	400	10.5	∞	∞	-
1	19	200	400	600	11.8	31.6	21.1	10.5
2	36	400	400	800	13.3	22.2	11.1	11.1
3	51	600	400	1000	15.4	19.6	7.8	11.8
4	64	800	400	1200	18.2	18.8	6.3	12.5
5	75	1000	400	1400	22.2	18.7	5.3	13.3
6	84	1200	400	1600	28.6	19.0	4.8	14.3
7	91	1400	400	1800	40.0	19.8	4.4	15.4
8	96	1600	400	2000		20.8	4.2	16.7

AFC, AVC, ATC, MC

Cost, Price

Q

AFC, AVC, ATC, MC

Cost, Price

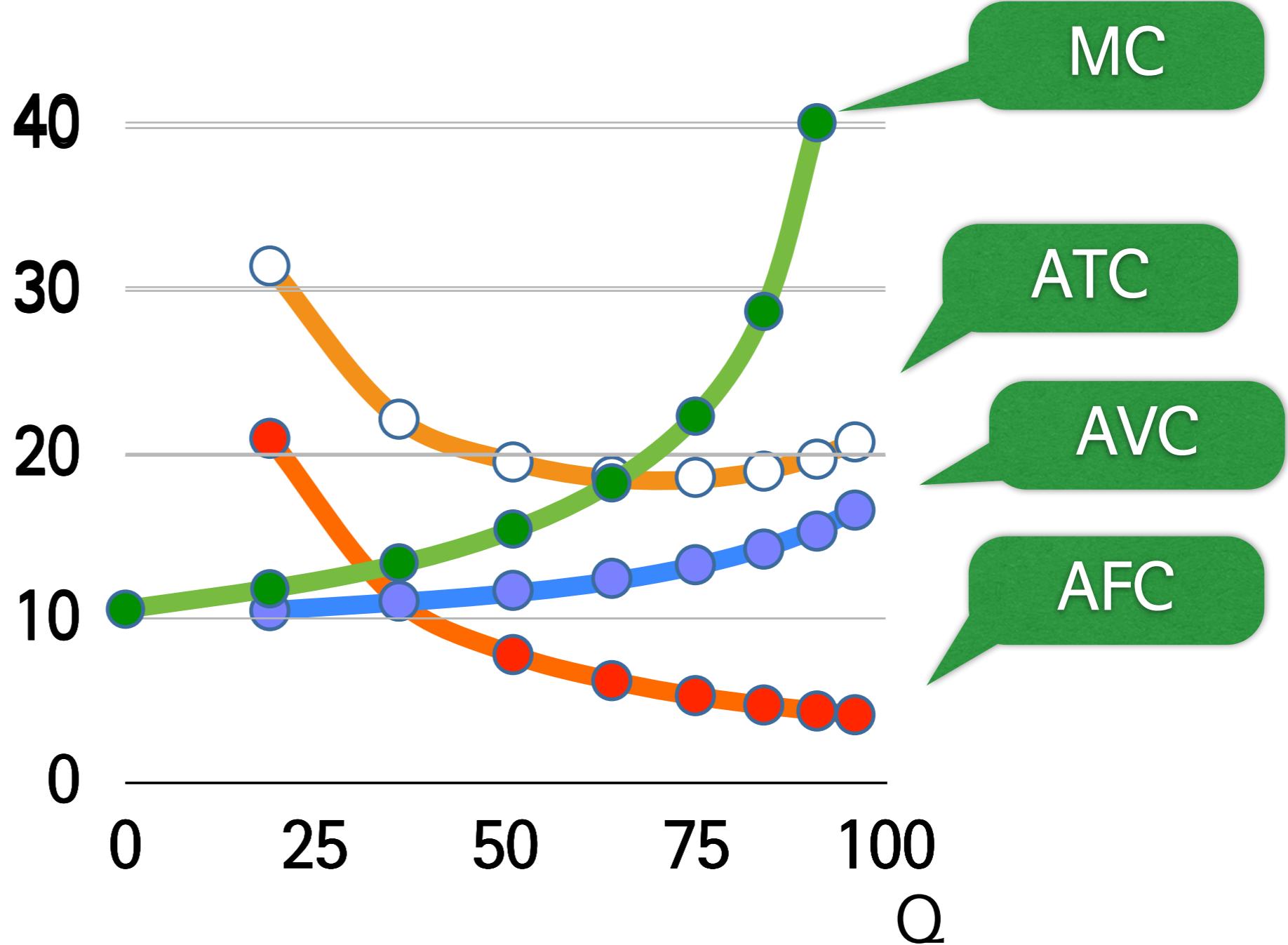
L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	M C(만원/단위)	AC(만원/단위)	AF C	AV C
0	0	0	400	400	10.5	∞	∞	-
1	19	200	400	600	11.8	31.6	21.1	10.5
2	36	400	400	800	13.3	22.2	11.1	11.1
3	51	600	400	1000	15.4	19.6	7.8	11.8
4	64	800	400	1200	18.2	18.8	6.3	12.5
5	75	1000	400	1400	22.2	18.7	5.3	13.3
6	84	1200	400	1600	28.6	19.0	4.8	14.3
7	91	1400	400	1800	40.0	19.8	4.4	15.4
8	96	1600	400	2000		20.8	4.2	16.7

Q

AFC, AVC, ATC, MC

Cost, Price

L(명)	Q(단위)	VC(만원)	FC(만원)	TC(만원)	MC(만원/단위)	AC(만원/단위)	AFC	AVC
0	0	0	400	400	10.5	∞	∞	-
1	19	200	400	600	11.8	31.6	21.1	10.5
2	36	400	400	800	13.3	22.2	11.1	11.1
3	51	600	400	1000	15.4	19.6	7.8	11.8
4	64	800	400	1200	18.2	18.8	6.3	12.5
5	75	1000	400	1400	22.2	18.7	5.3	13.3
6	84	1200	400	1600	28.6	19.0	4.8	14.3
7	91	1400	400	1800	40.0	19.8	4.4	15.4
8	96	1600	400	2000		20.8	4.2	16.7



완전경쟁시장에서의 공급 전략: AC Minimizing

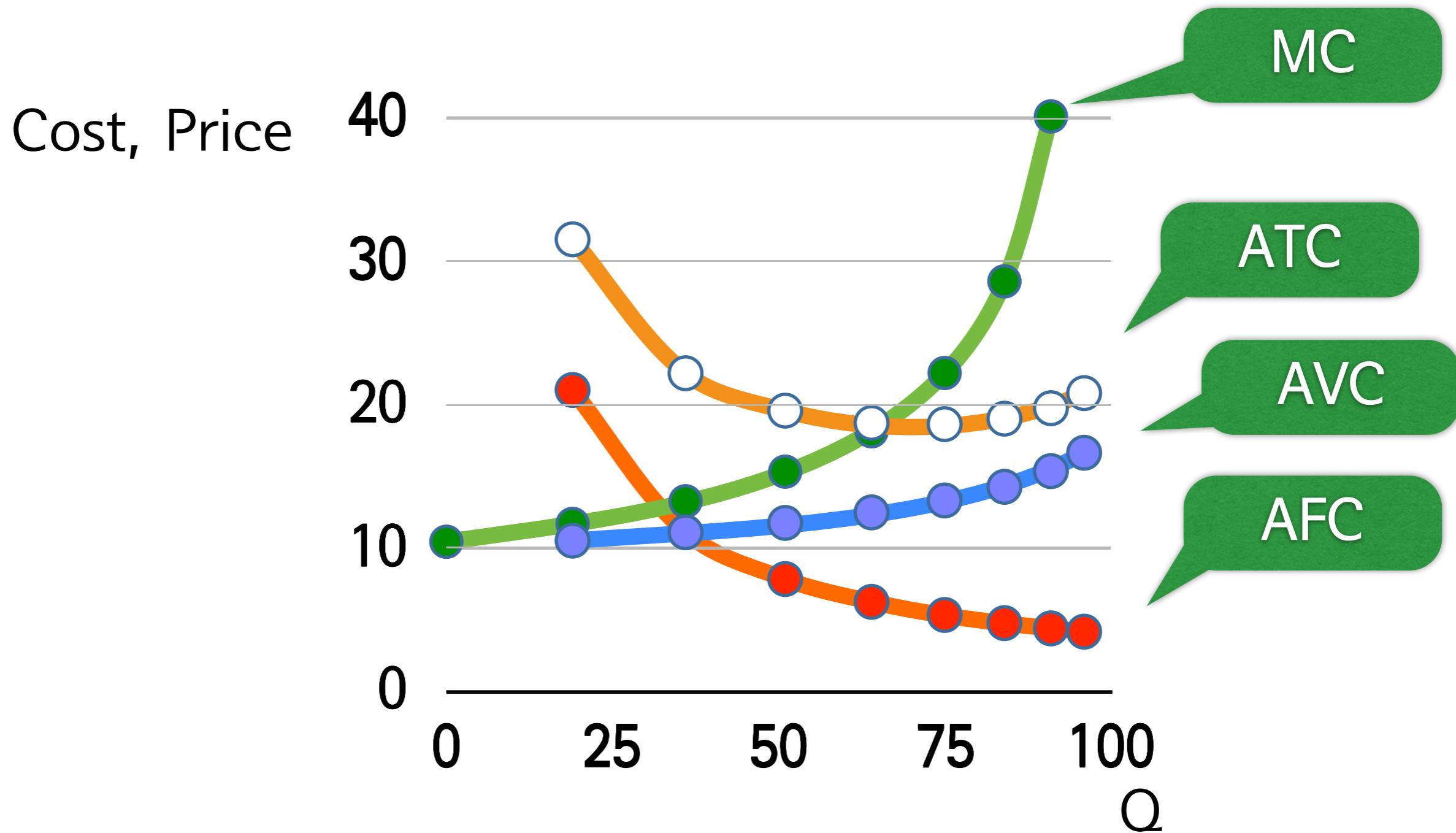
- 완전경쟁시장에서는 균형 가격(P^*)이 시장에서 결정되고, 그 가격에 공급하면 모두 판매 가능(수량: q^*)
- 기업목표: 이윤 극대화 = $[P^* \times q^* - TC]$ 극대화 = $[P^* \times q^* - AC \times q^*] = [(P^* - AC) \times q^*]$ 극대화
- ∴ 이윤극대화 = (평균)비용 극소화

Optimal Point: Minimum of AC

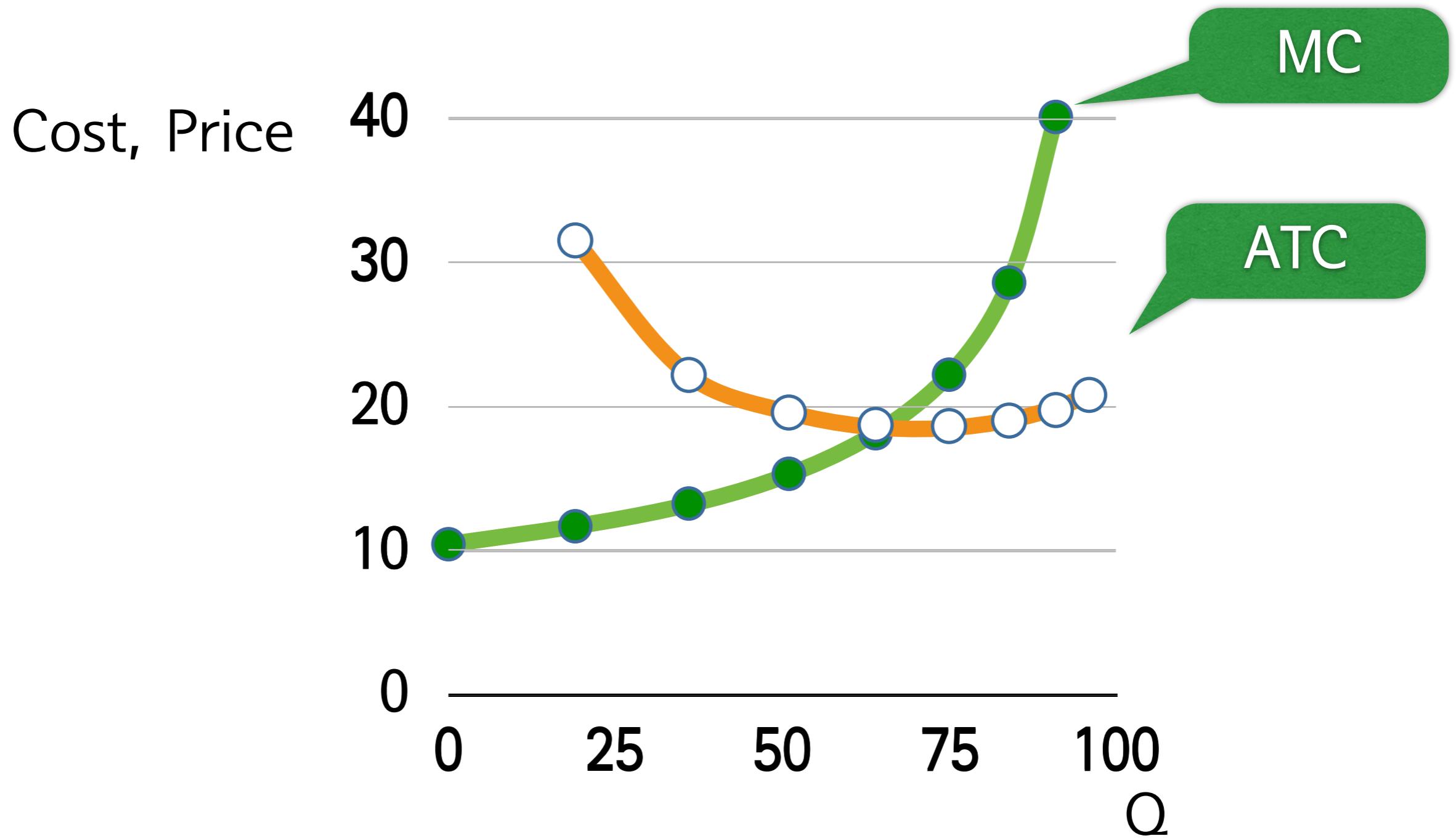
Cost, Price

Q

Optimal Point: Minimum of AC



Optimal Point: Minimum of AC

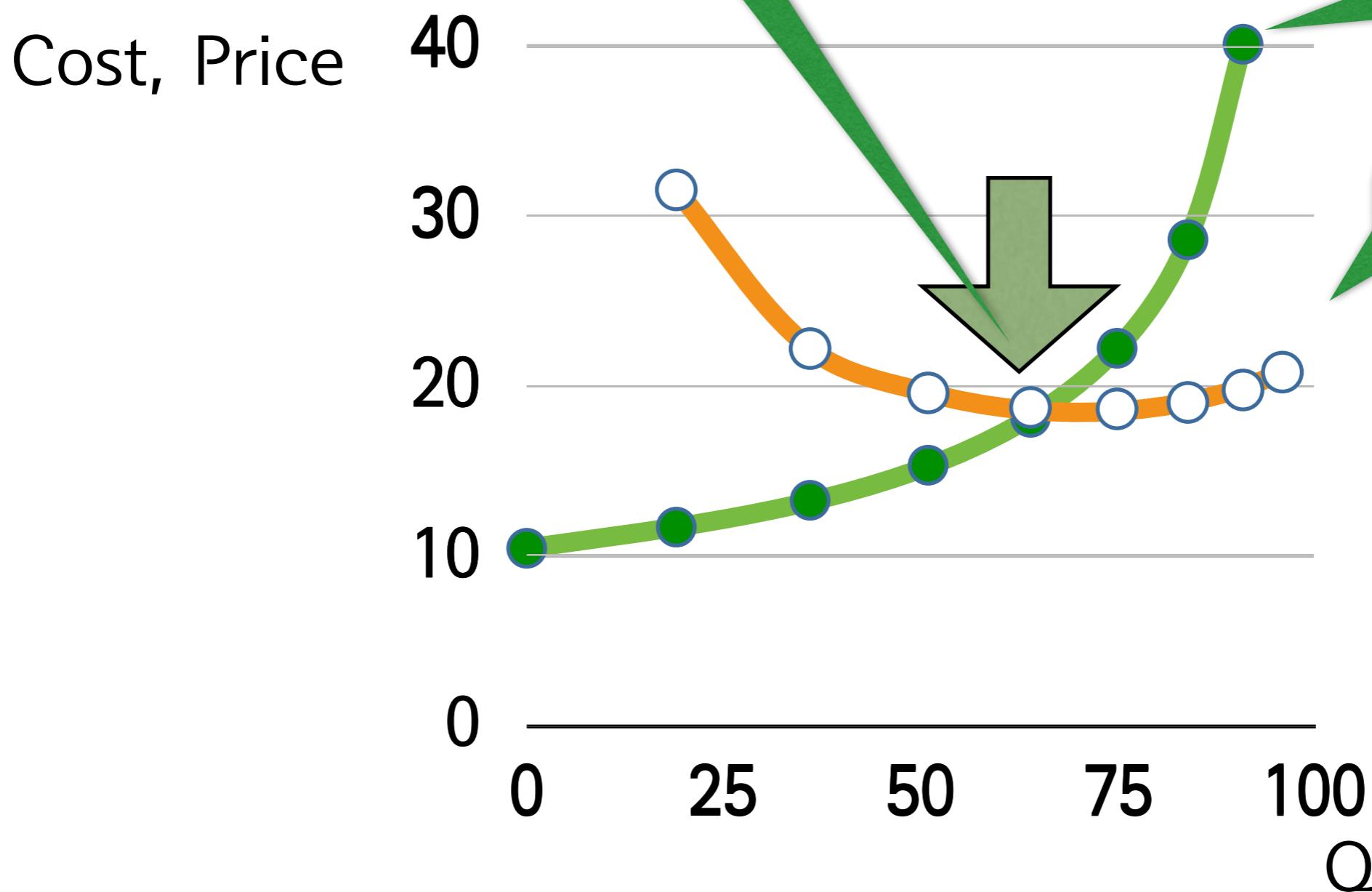


Optimal Point: Minimum of AC

Minimum-cost output

MC

ATC

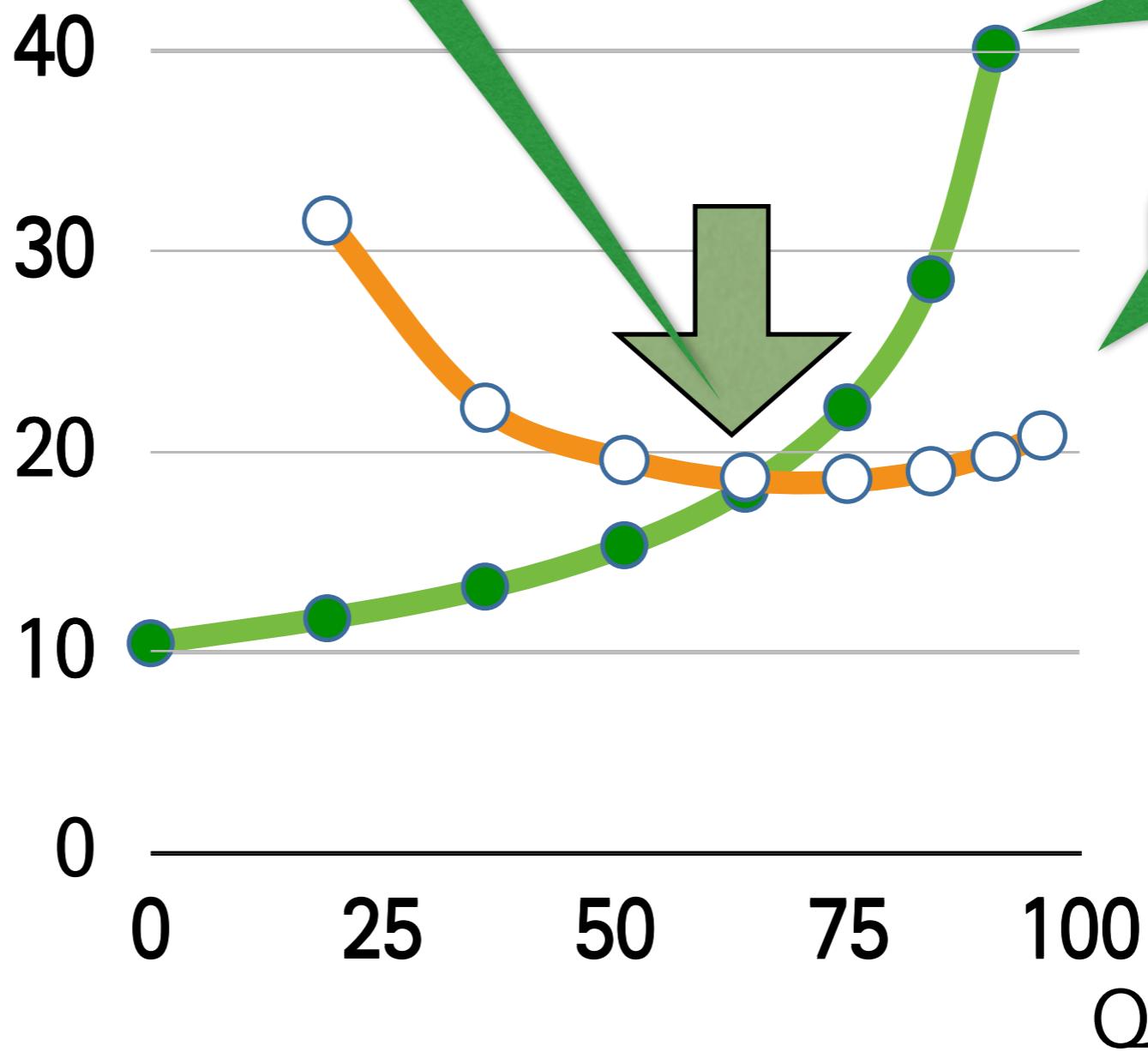


Optimal Point: Minimum of AC

Minimum-cost output

Cost, Price

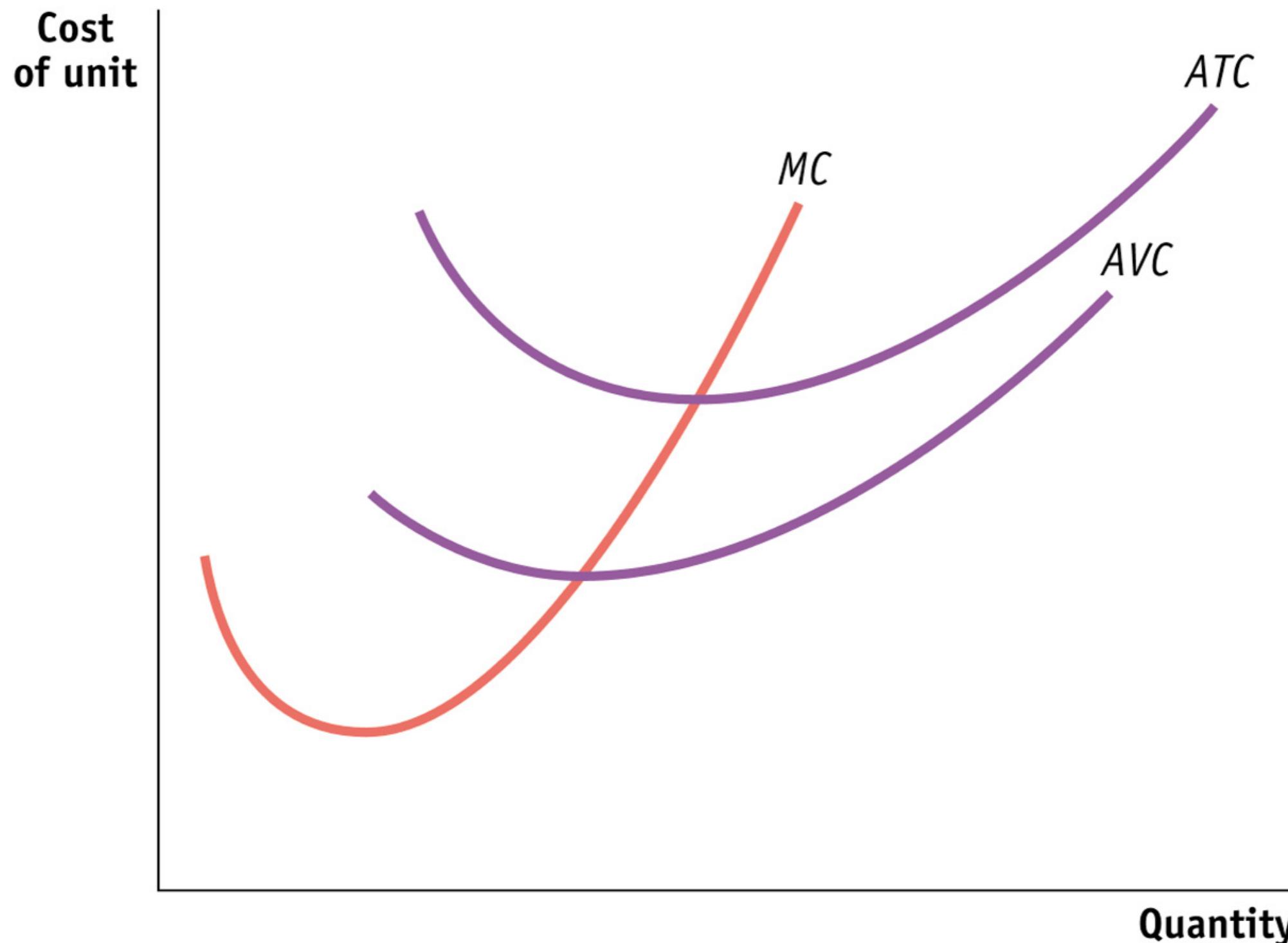
Q(단위)	MC(만원/ 단위)	AC(만원/ 단위)
0	10.53	∞
19	11.76	31.58
36	13.33	22.22
51	15.38	19.61
64	18.18	18.75
75	22.22	18.67
84	28.57	19.05
91	40.00	19.78
96		20.83



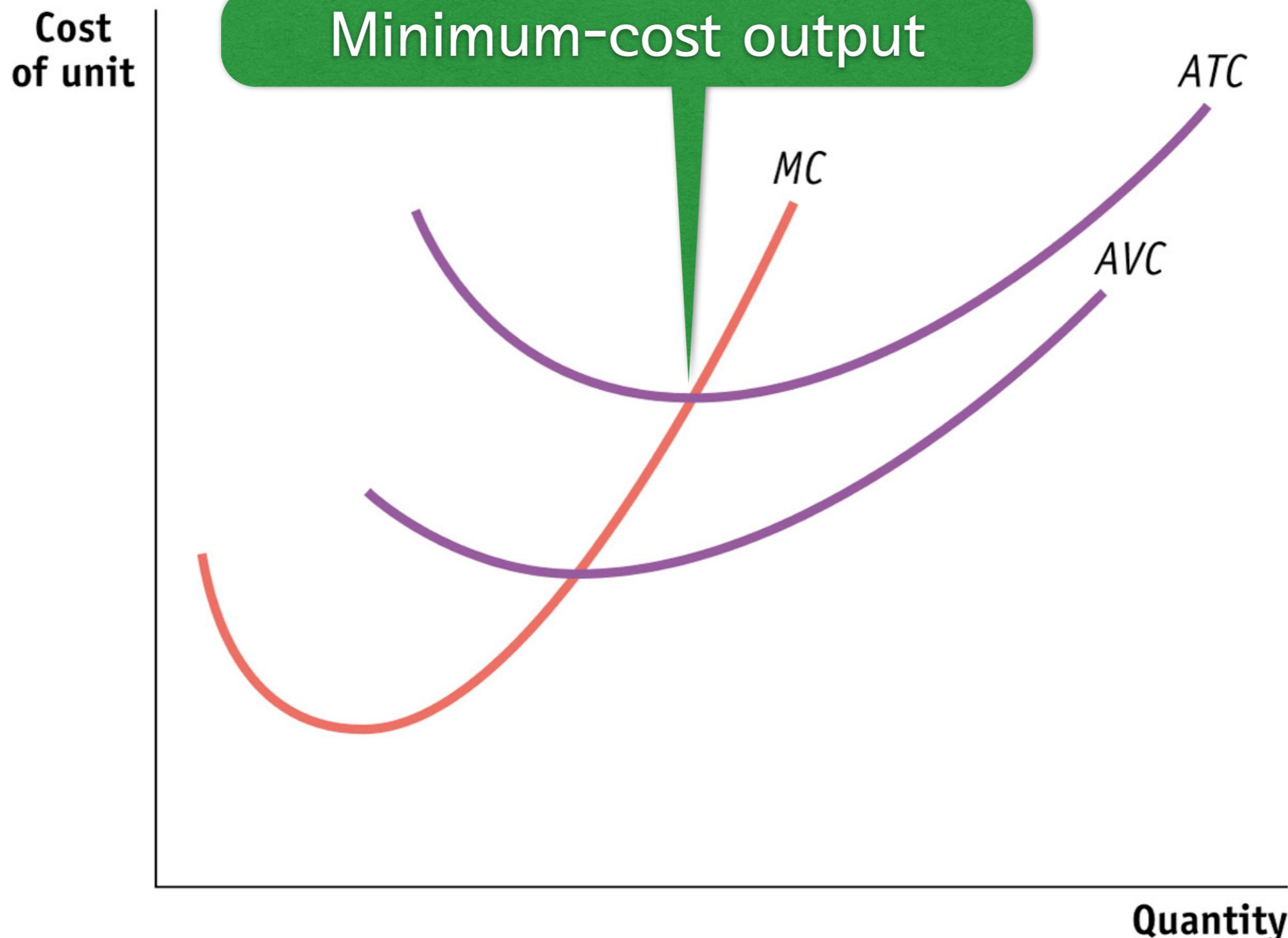
MC-AC meets at the minimum of AC

- ATC의 최소점 = MC곡선과 ATC곡선이 만나는 점
 - $MC < ATC$: ATC \downarrow : Good!: Q \uparrow
 - $MC > ATC$: ATC \uparrow : Bad!: Q \downarrow
- 위 과정은 $MC=ATC$ 가 될때까지 반복

General Cost cv.



General Cost cv.



단기, 장기 Short-run, Long-run

장/단기의 의미

- 지금까지의 분석은 모두 단기분석
- 단기의 정의: 고정비용이 조정될 수 없는 기간
 - 고정비용: 상수
- 장기의 정의: 고정요소마저 조정될 수 있는 기간
 - 고정비용: 변수

고정비용의 선택문제

- 장기적으로는 고정비용도 정해야 함
- Trade-off:
 - 낮은 고정비용 / 높은 가변비용?
 - 높은 고정비용 / 낮은 가변비용?

Ex. 스타크래프트의 선택문제

- 낮은 테크트리(저자본) + 등장이 빠르지만 비용대비 낮은 화력
- 높은 테크트리(고자본) + 등장이 늦지만 비용대비 강한 화력



Extended Example for Long Run Analysis

- 쌀농사의 예에서, 고정비용을 2배로 늘릴 경우, 가변비용이 $\frac{1}{2}$ 배가 되는 성질이 있다고 “가정”
 - 고정비용과 가변비용간의 Trade-off 존재

AC1 vs. AC2

AC1 vs. AC2

L(명)	Q(단위)	VC(만원)	FC(만원)	AC1(만 원/단위)
0	0	0	400	∞
1	19	200	400	31.6
2	36	400	400	22.2
3	51	600	400	19.6
4	64	800	400	18.8
5	75	1000	400	18.7
6	84	1200	400	19.0
7	91	1400	400	19.8
8	96	1600	400	20.8

AC1 vs. AC2

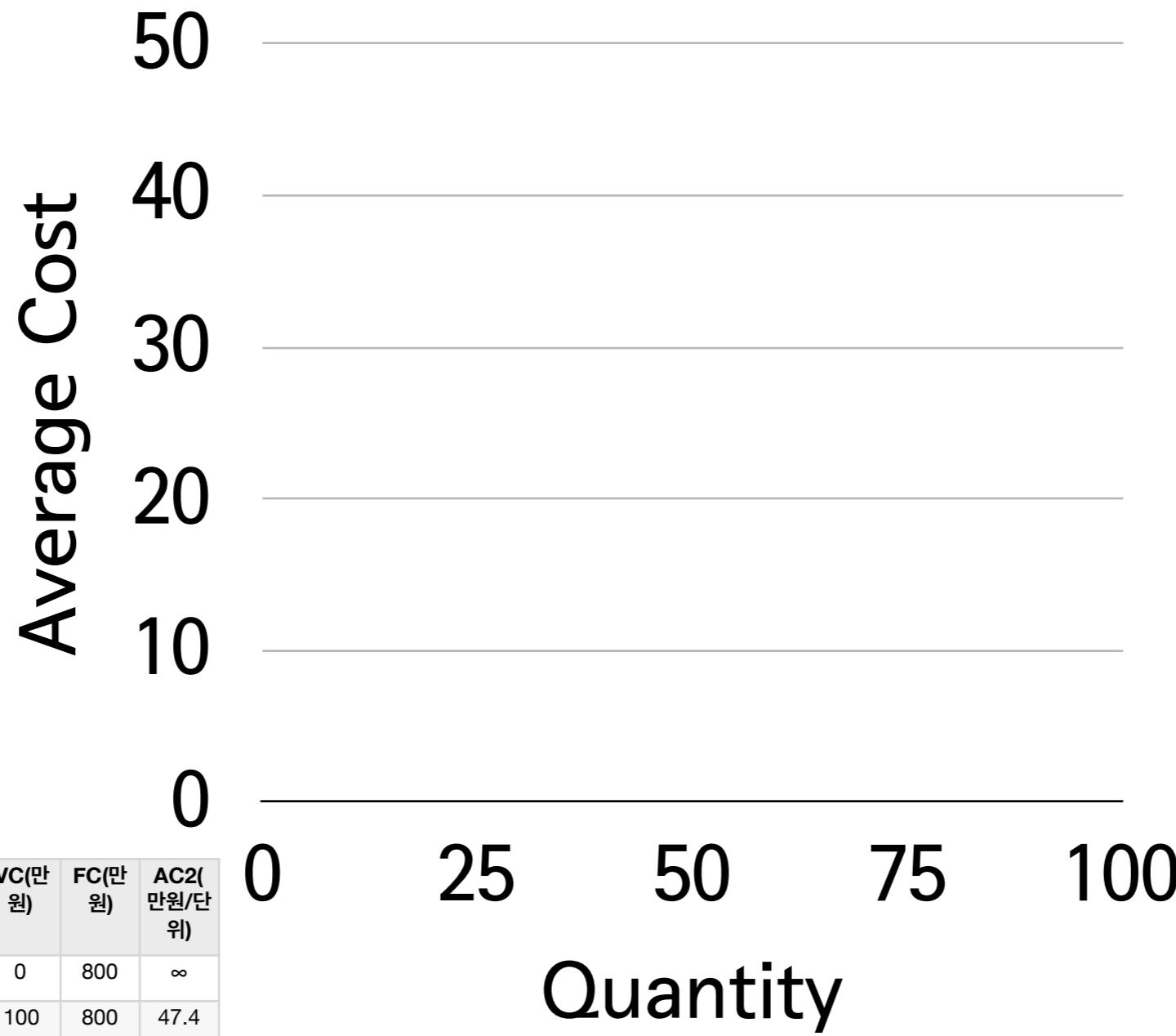
L(명)	Q(단위)	VC(만원)	FC(만원)	AC1(만 원/단위)	Q(단위)	VC(만원)	FC(만원)	AC2(만 원/단위)
0	0	0	400	∞	0	0	800	∞
1	19	200	400	31.6	19	100	800	47.4
2	36	400	400	22.2	36	200	800	27.8
3	51	600	400	19.6	51	300	800	21.6
4	64	800	400	18.8	64	400	800	18.8
5	75	1000	400	18.7	75	500	800	17.3
6	84	1200	400	19.0	84	600	800	16.7
7	91	1400	400	19.8	91	700	800	16.5
8	96	1600	400	20.8	96	800	800	16.7

AC curve

AC curve

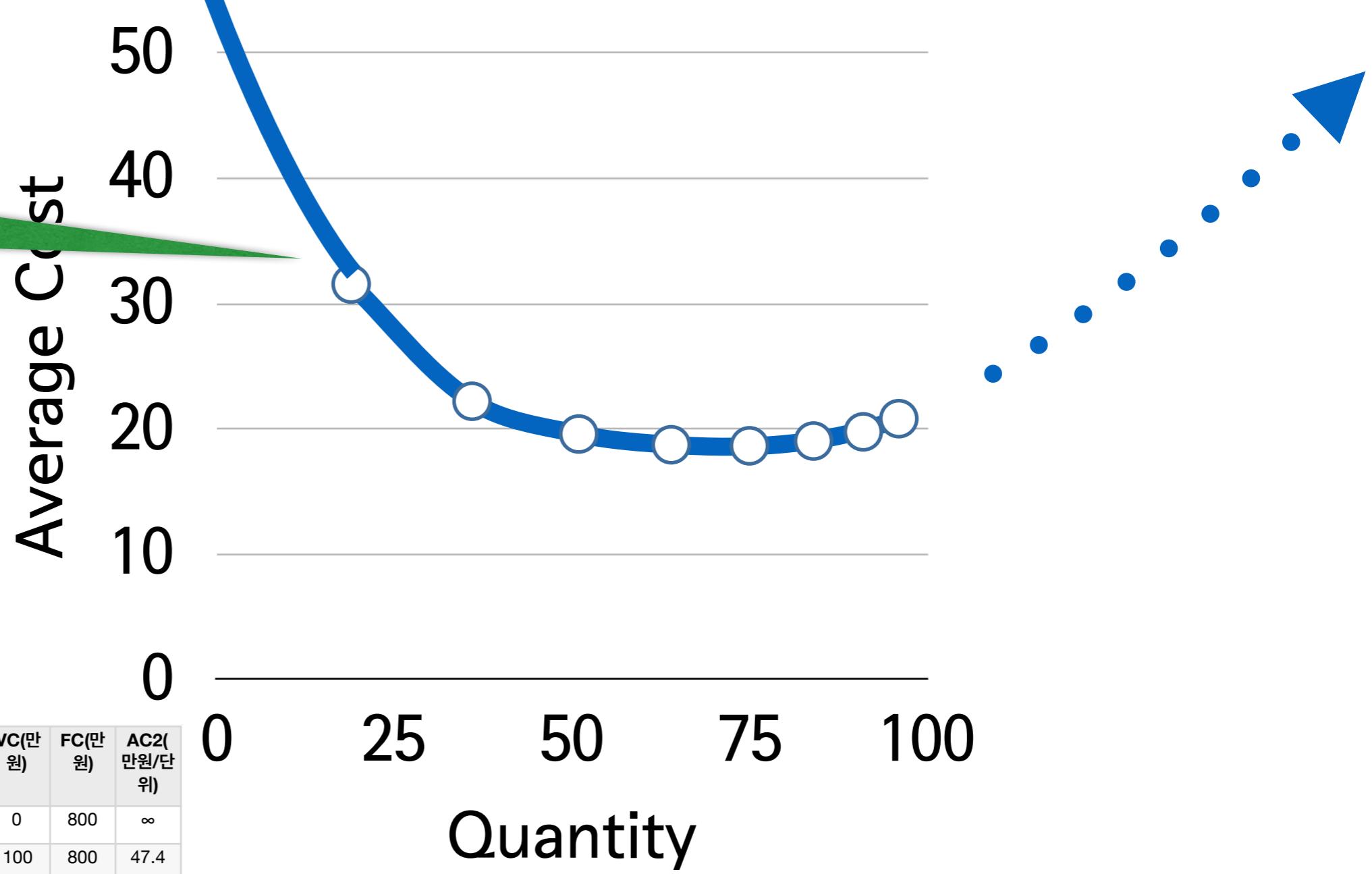
L(명)	Q(단위)	VC(만원)	FC(만원)	AC1(만원/단위)	Q(단위)	VC(만원)	FC(만원)	AC2(만원/단위)
0	0	0	400	∞	0	0	800	∞
1	19	200	400	31.6	19	100	800	47.4
2	36	400	400	22.2	36	200	800	27.8
3	51	600	400	19.6	51	300	800	21.6
4	64	800	400	18.8	64	400	800	18.8
5	75	1000	400	18.7	75	500	800	17.3
6	84	1200	400	18.6	84	600	800	16.7

AC curve



AC curve

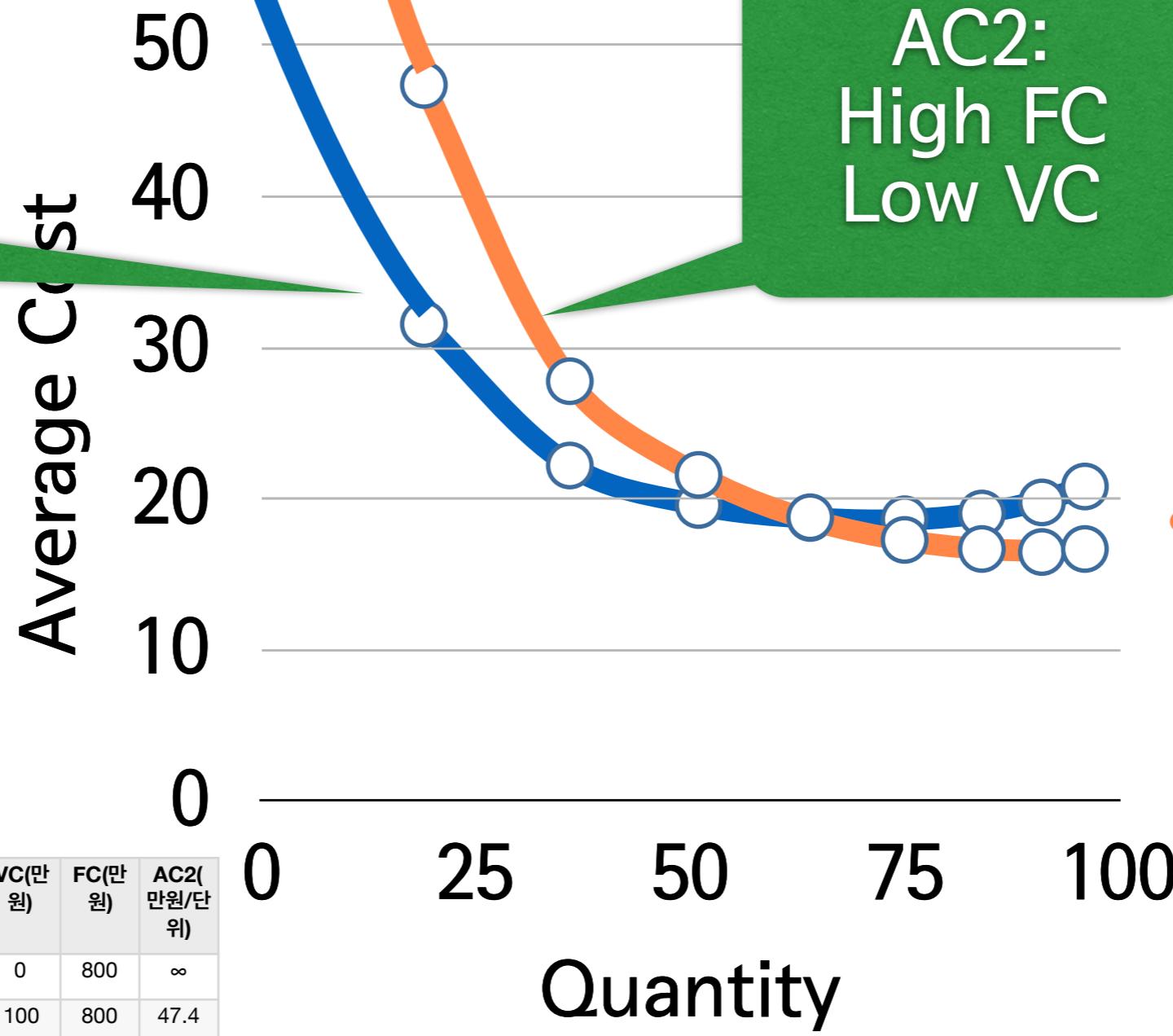
AC1:
Low FC
High VC



AC curve

AC1:
Low FC
High VC

AC2:
High FC
Low VC

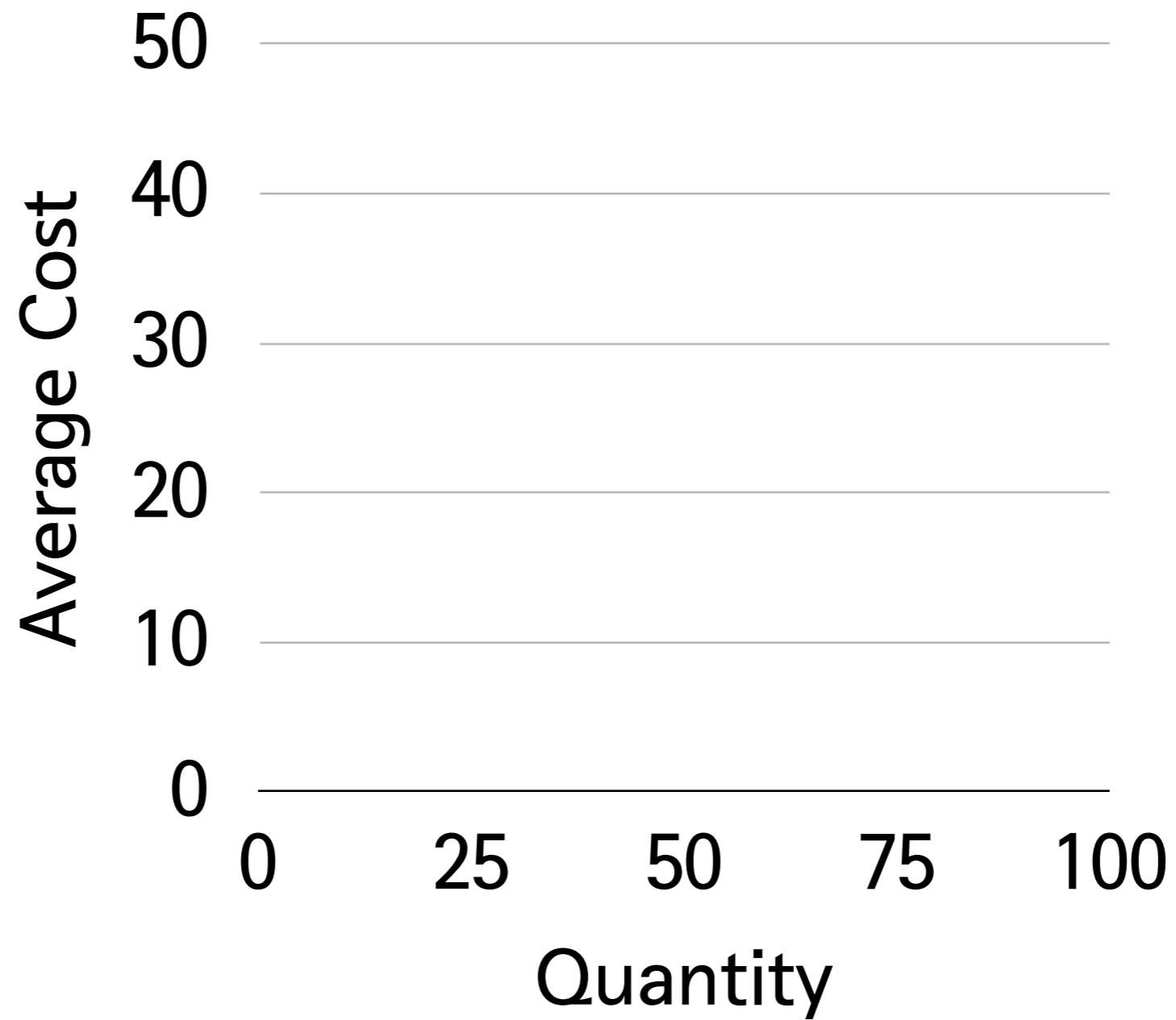


LAC cv.: Long-run Average Cost curve

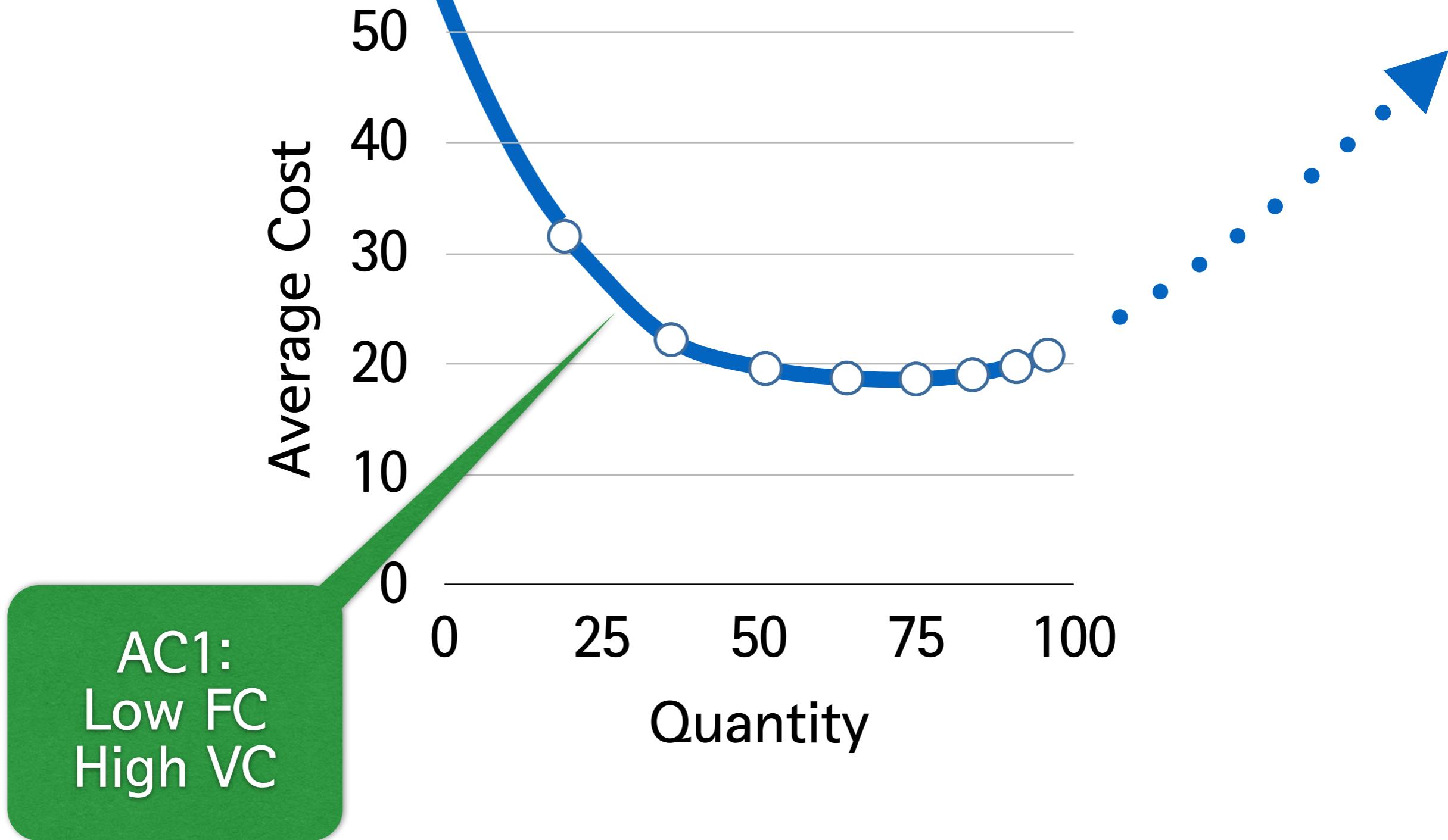
- 고정비용에 따라 AC는 달라짐
 - SAC: 단기(Short run) AC
 - LAC: 장기(Long run) AC
- 장기 최적(LAC최소화) 생산량 결정절차
 - STEP1: 모든 고정비용에 따라 SAC를 그린다.
 - STEP2: 위 SAC들 중 LAC를 최소화하는 SAC를 선택한다

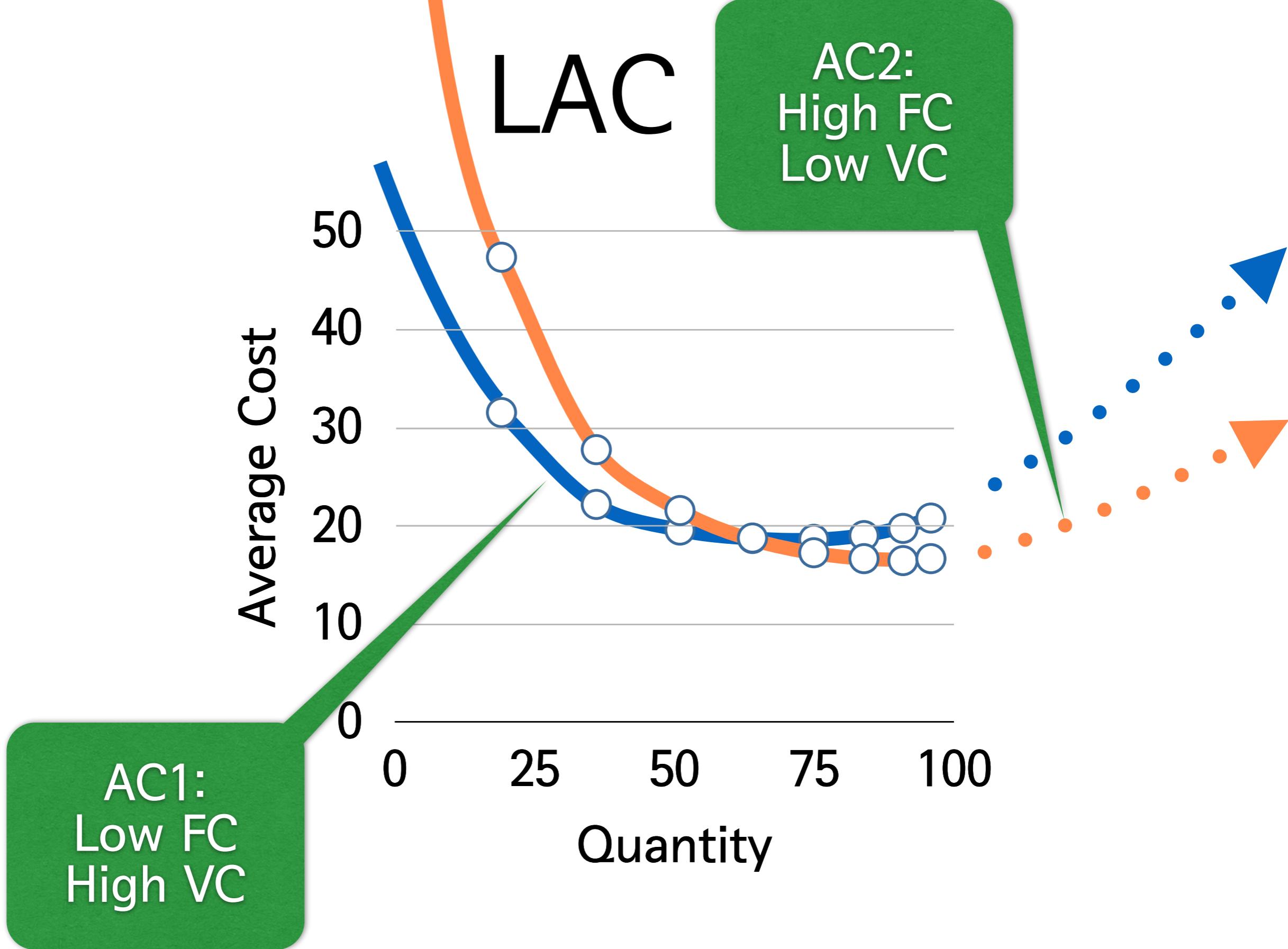
LAC

LAC



LAC





AC1:
Low FC
High VC

Average Cost

50
40
30
20
10
0

0 25 50 75 100

Quantity

LAC

AC2:
High FC
Low VC

LAC:
Envelope
Curve

AC1:
Low FC
High VC

Average Cost

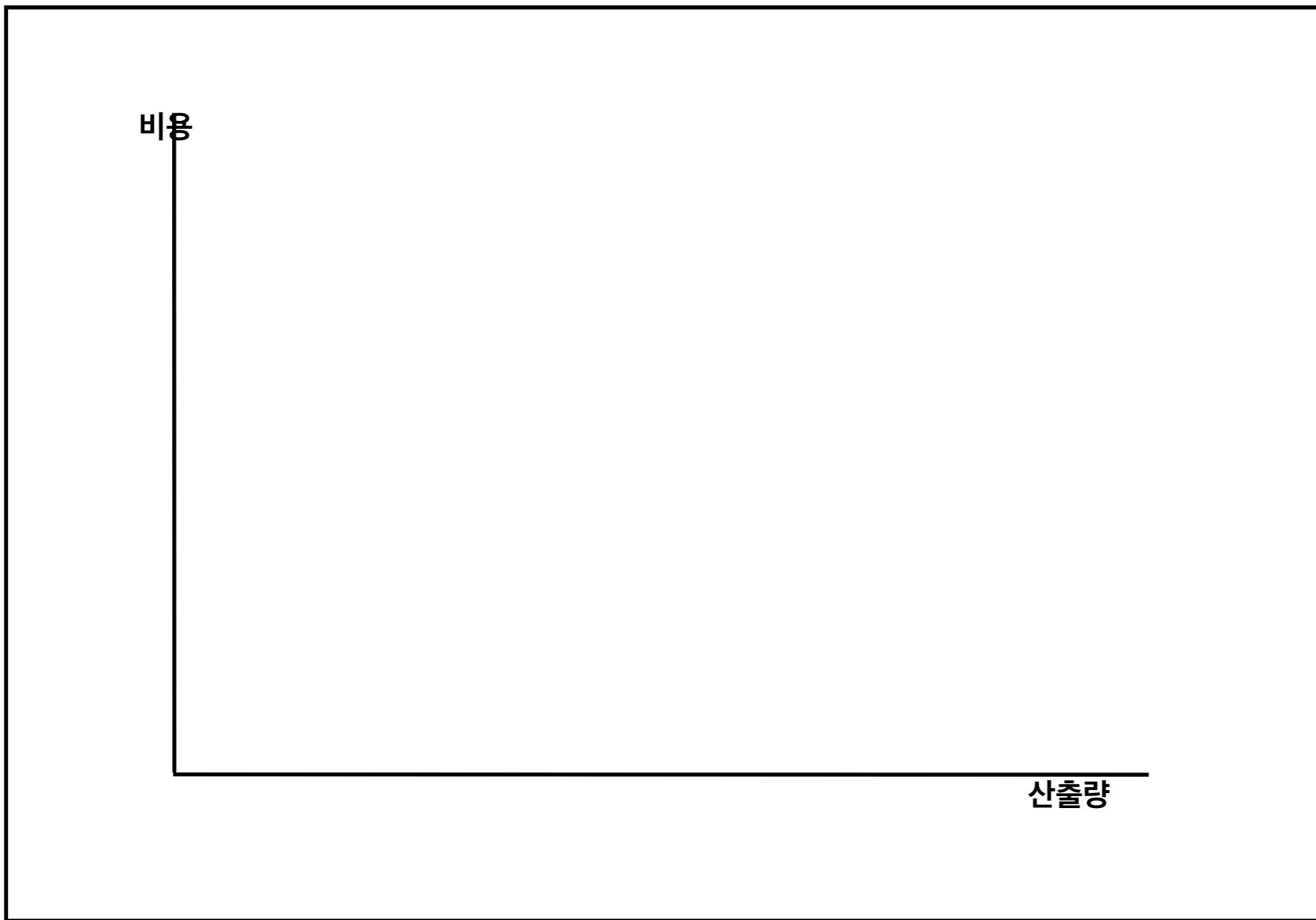
LAC

AC2:
High FC
Low VC

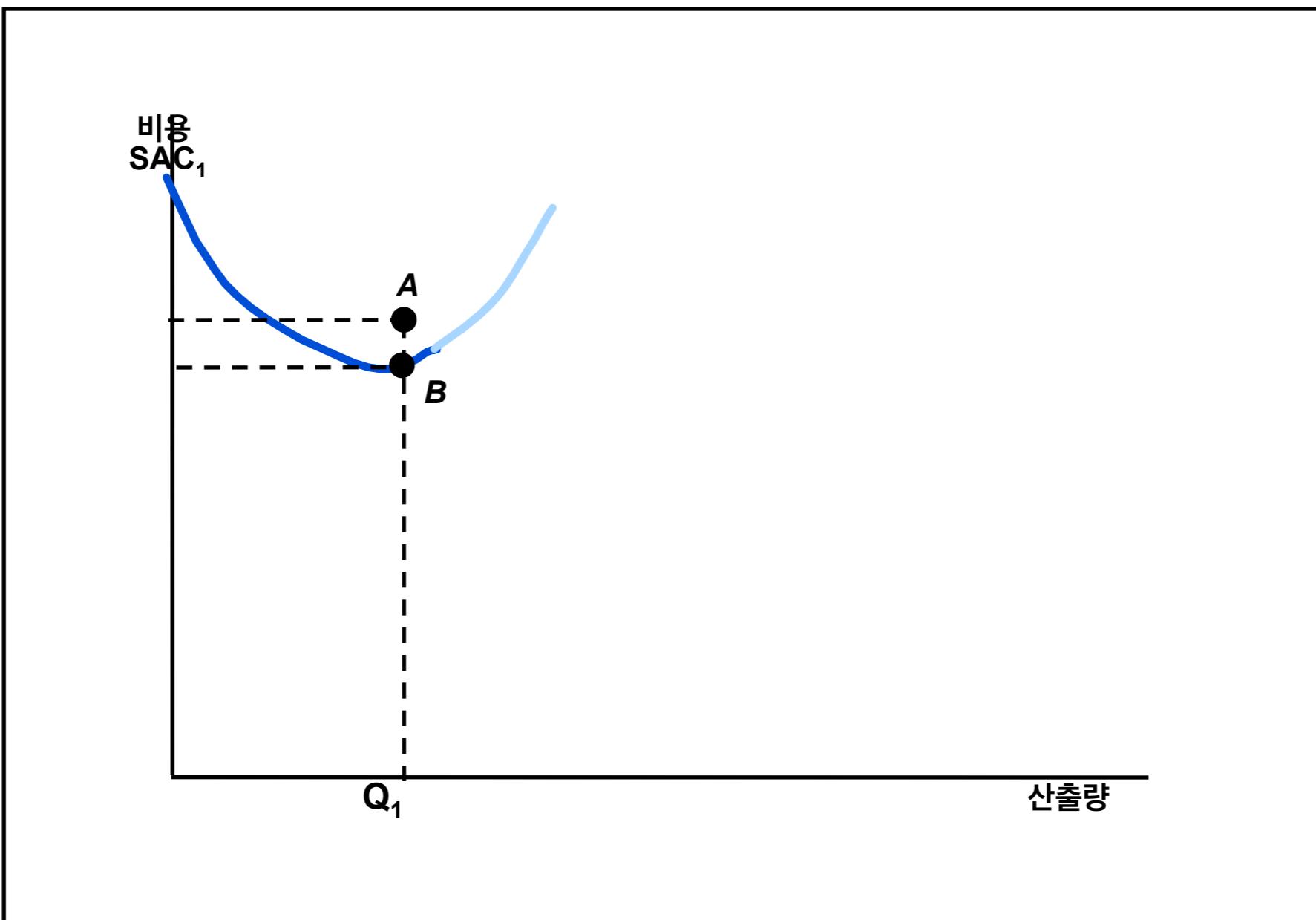
Quantity

LAC: General case

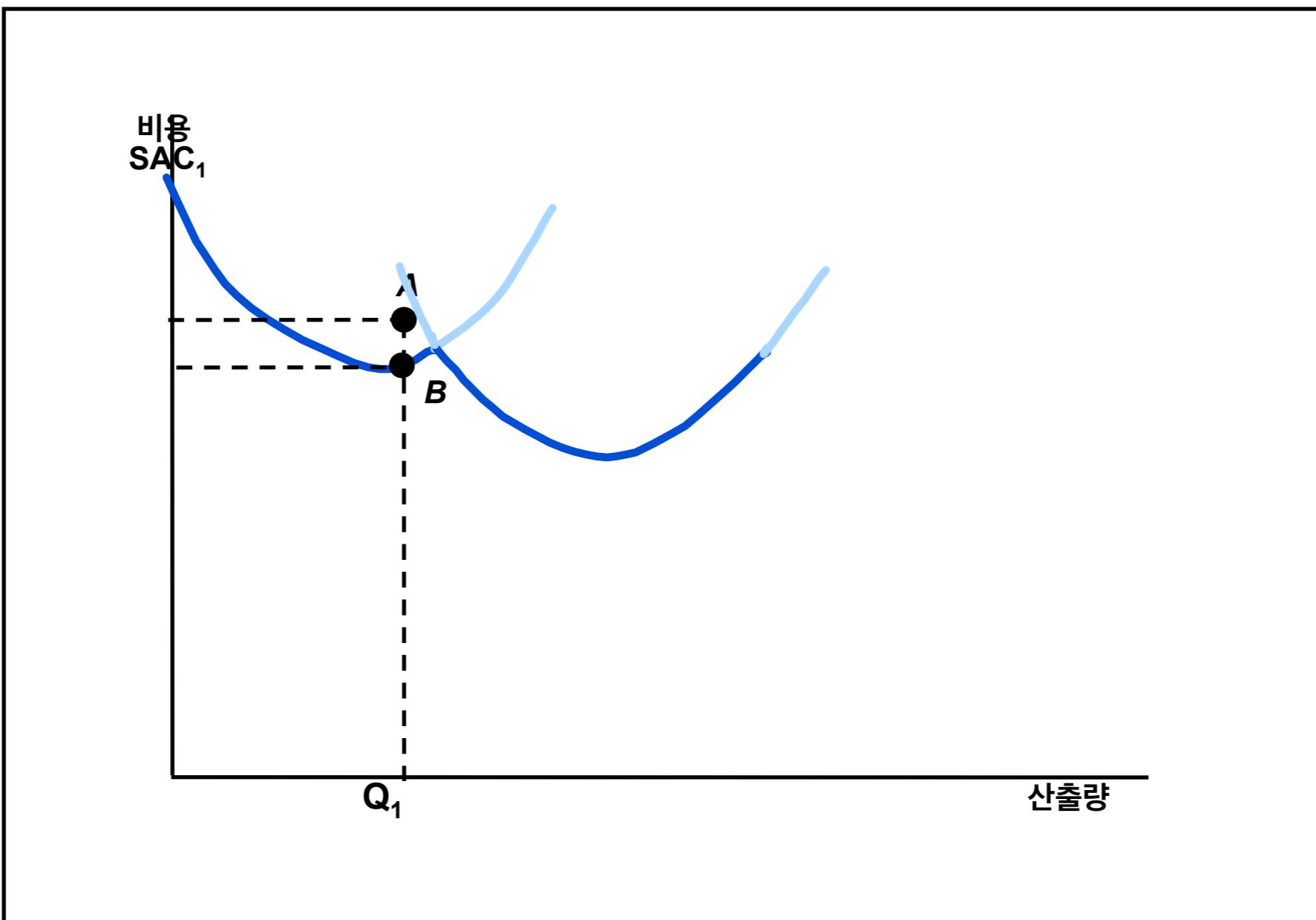
LAC: General case



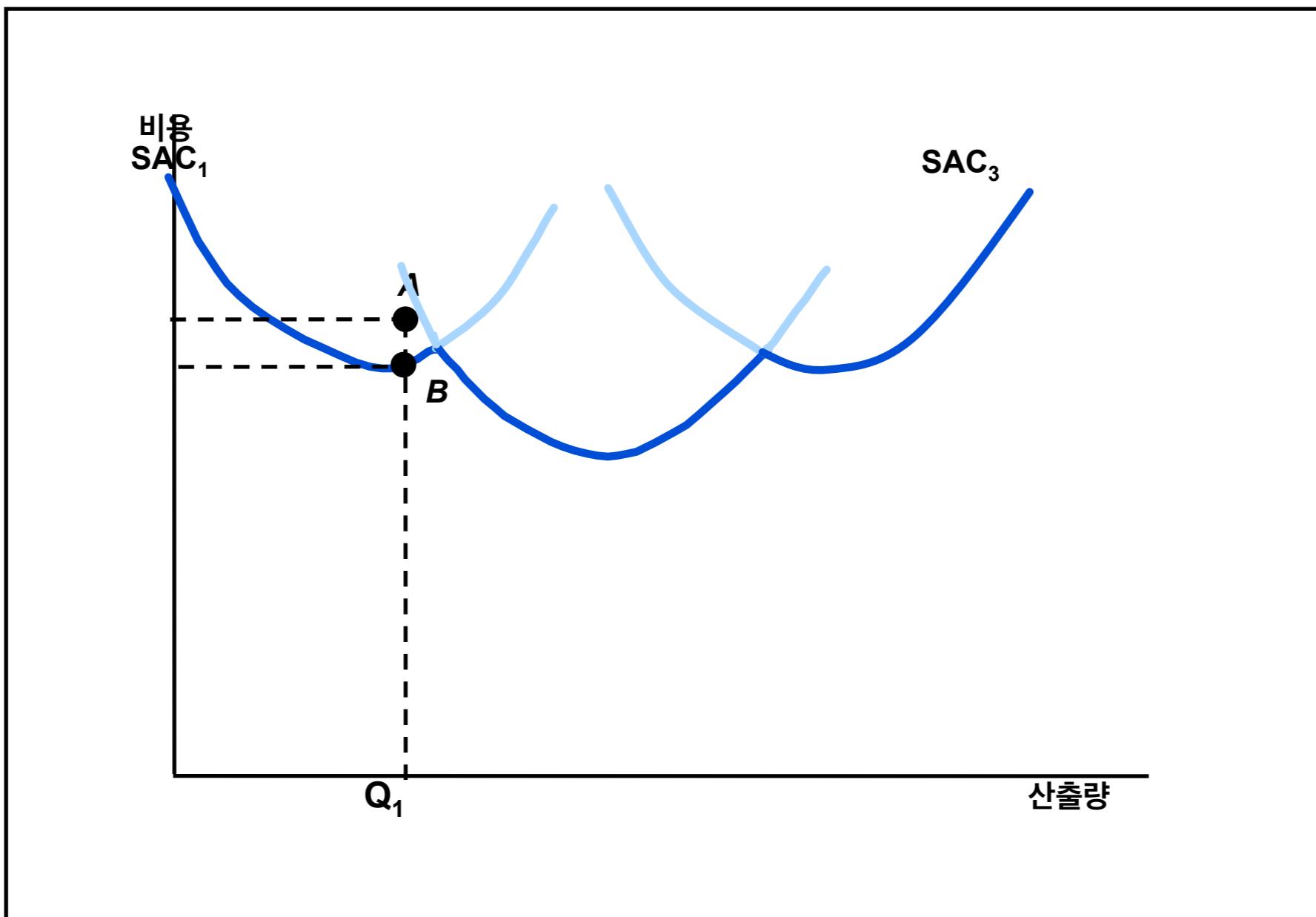
LAC: General case



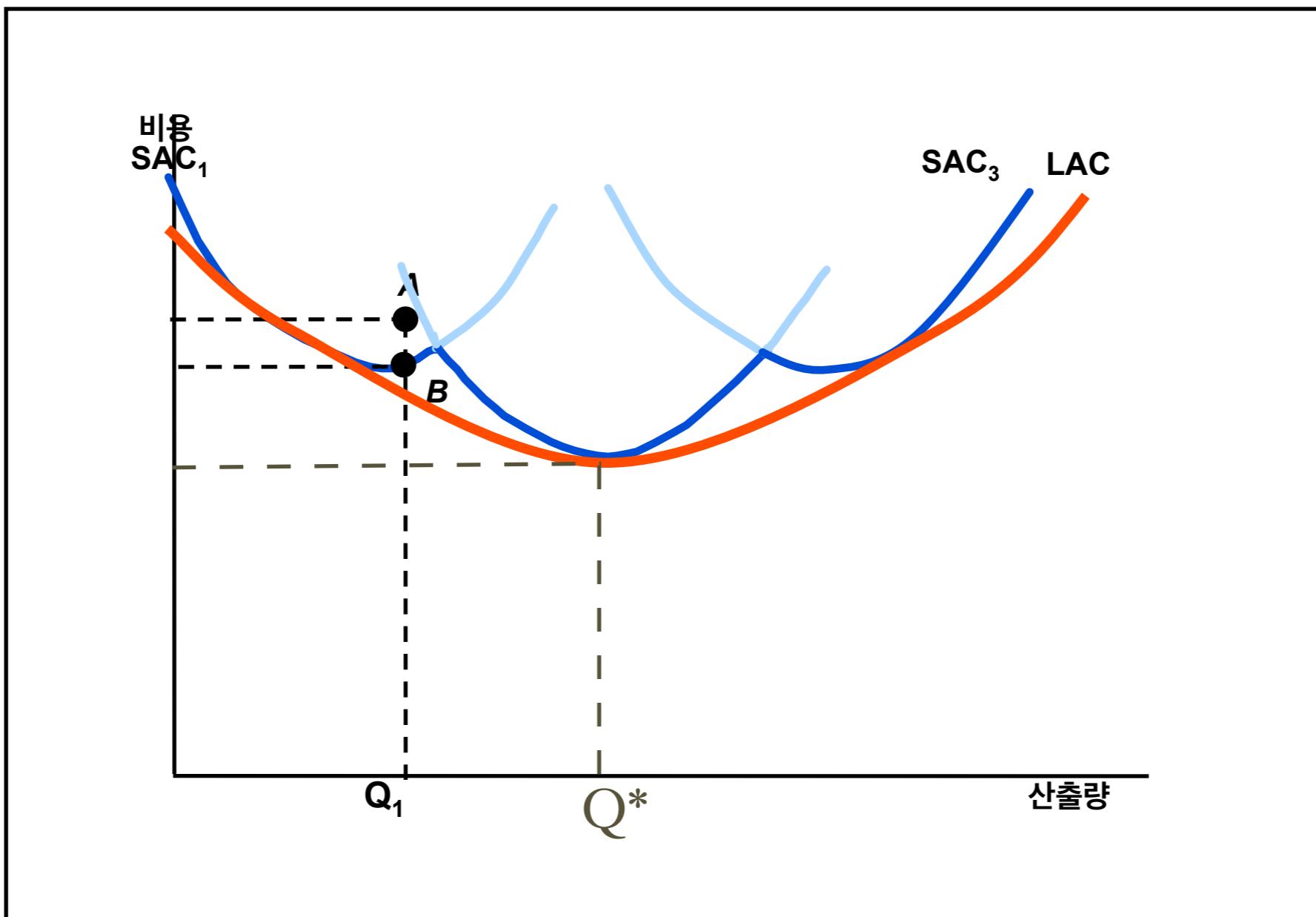
LAC: General case



LAC: General case



LAC: General case

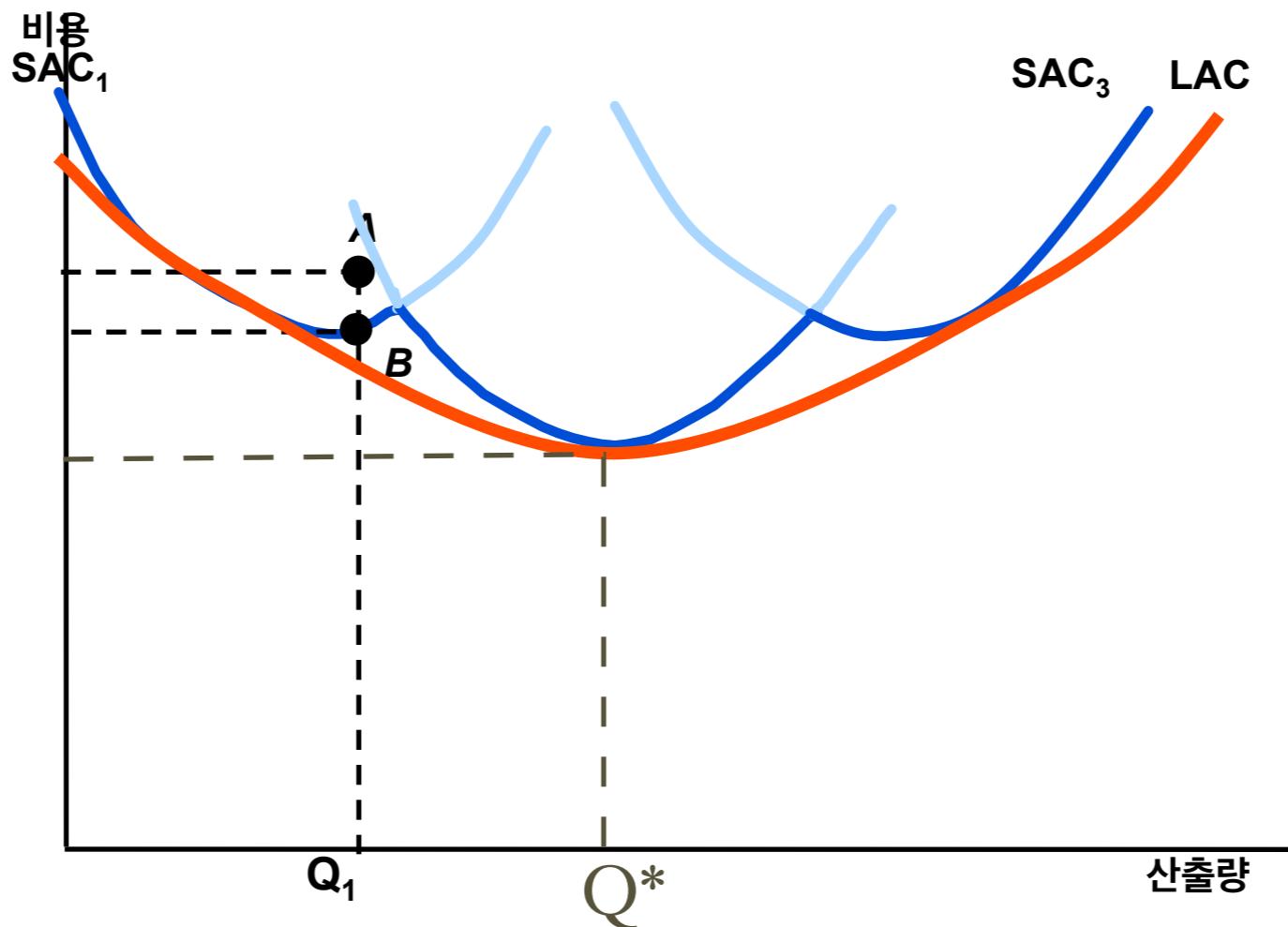


규모의 경제와 불경제 (dis)Economics of scale

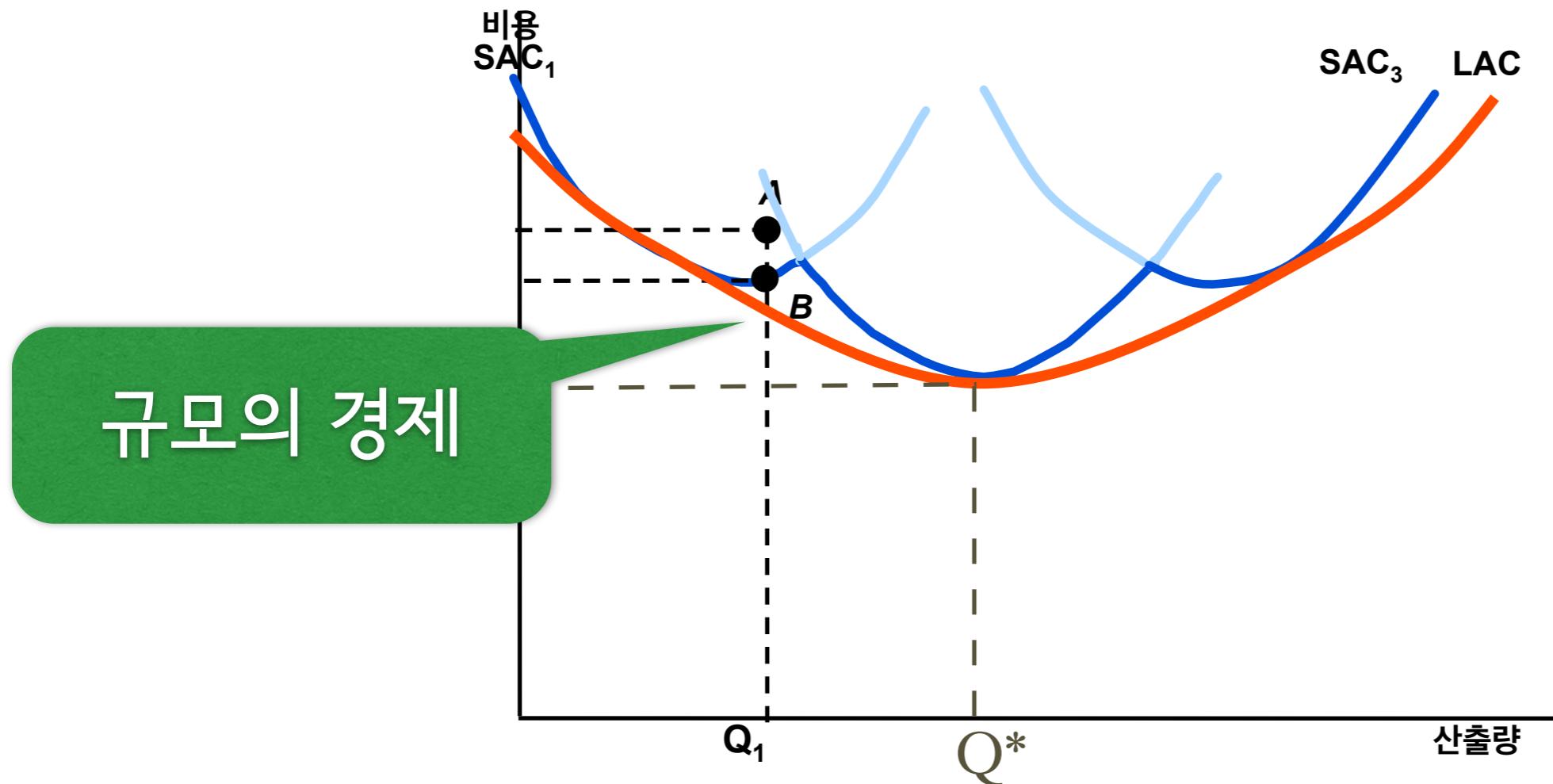
- 규모의 [불]경제: 산출량(Q)증가에 따라 장기평균비용(LAC)이 하락[상승]하는 경우
 - 규모의 경제구간: 생산 규모(고정비용)가 클수록 비용 절감
 - 규모의 불경제구간: 생산 규모가 작을 수록 비용 절감
 - 결국 장기적으로 최적 규모는 LAC를 최소화 할 수 있는 SAC의 고정비용규모로 결정됨

LAC: General case

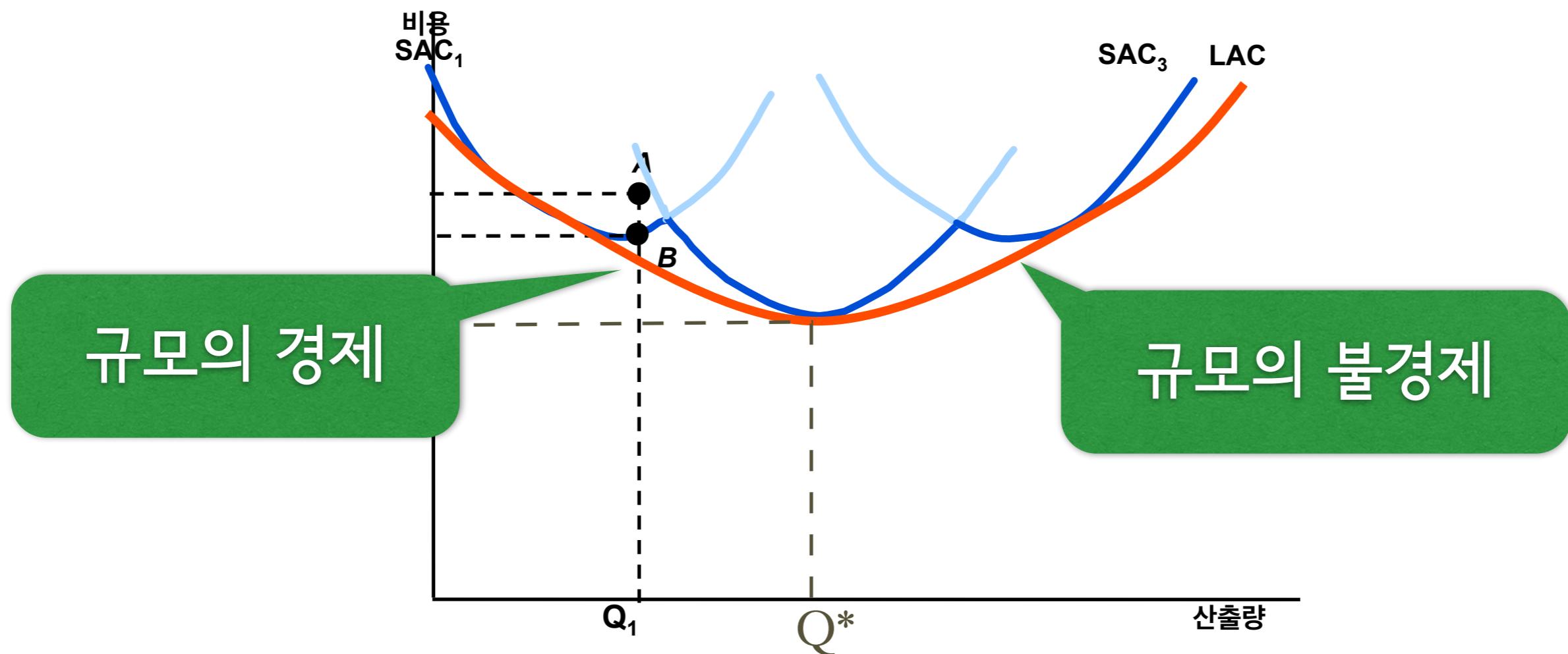
LAC: General case



LAC: General case



LAC: General case



규모효과: IRS, CRS, DRS

- IRS(Increasing Return to Scale): 규모가 커질수록 비용이 하락하는 생산기술(SW 등)
- CRS(Constant Return to Scale): 규모에 상관없이 비용이 일정한 생산기술
- DRS(Diminishing Return to Scale): 규모가 커질수록 비용이 증가하는 생산기술

Next Topic

- 공급(II)

수고하셨습니다!



수고하셨습니다!

