

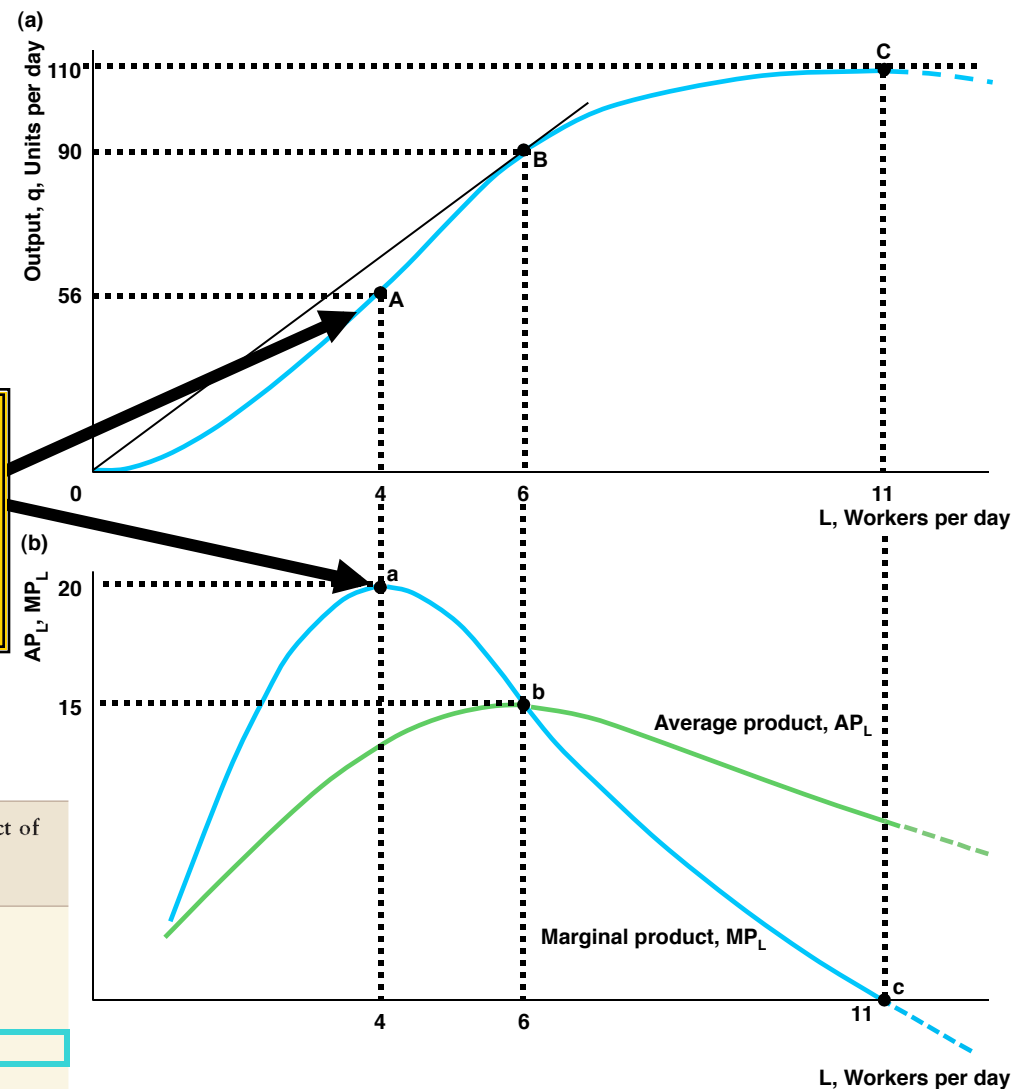
Table 6.1 Total Product, Marginal Product, and Average Product of Labor with Fixed Capital

Capital, \bar{K}	Labor, L	Output, Total Product of Labor, Q	Marginal Product of Labor, $MP_L = \Delta Q / \Delta L$	Average Product of Labor, $AP_L = Q / L$
8	0	0		
8	1	5	5	5
8	2	18	13	9
8	3	36	18	12
8	4	56	20	14
8	5	75	19	15
8	6	90	15	15
8	7	98	8	14
8	8	104	6	13
8	9	108	4	12
8	10	110	2	11
8	11	110	0	10
8	12	108	-2	9
8	13	104	-4	8



Figure 6.1 Production Relationships with Variable Labor

Diminishing
Marginal Returns
sets in!



Capital, \bar{K}	Labor, L	Output, Total Product of Labor, Q	Marginal Product of Labor, $MP_L = \Delta Q / \Delta L$	Average Product of Labor, $AP_L = Q / L$
8	0	0		
8	1	5	5	5
8	2	18	13	9
8	3	36	18	12
8	4	56	20	14
8	5	75	19	15
8	6	90	15	15
8	7	98	8	14
8	8	104	6	13
8	9	108	4	12
8	10	110	2	11
8	11	110	0	10
8	12	108	-2	9
8	13	104	-4	8



Table 6.2 Output Produced with Two Variable Inputs

Capital, K	Labor, L					
	1	2	3	4	5	6
1	10	14	17	20	22	24
2	14	20	24	28	32	35
3	17	24	30	35	39	42
4	20	28	35	40	45	49
5	22	32	39	45	50	55
6	24	35	42	49	55	60

Figure 6.2 Family of Isoquants

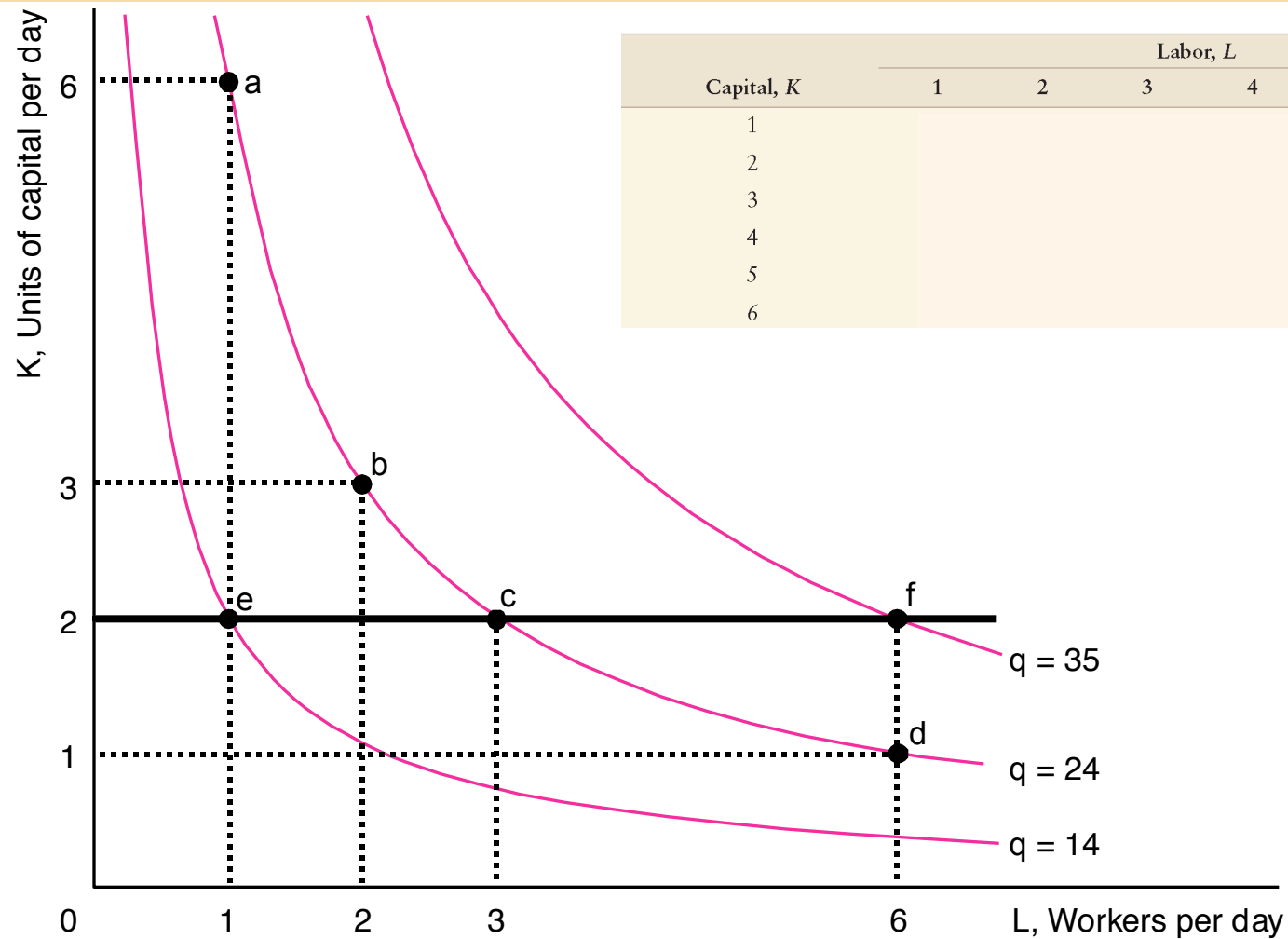


Figure 6.3a,b Substitutability of Inputs

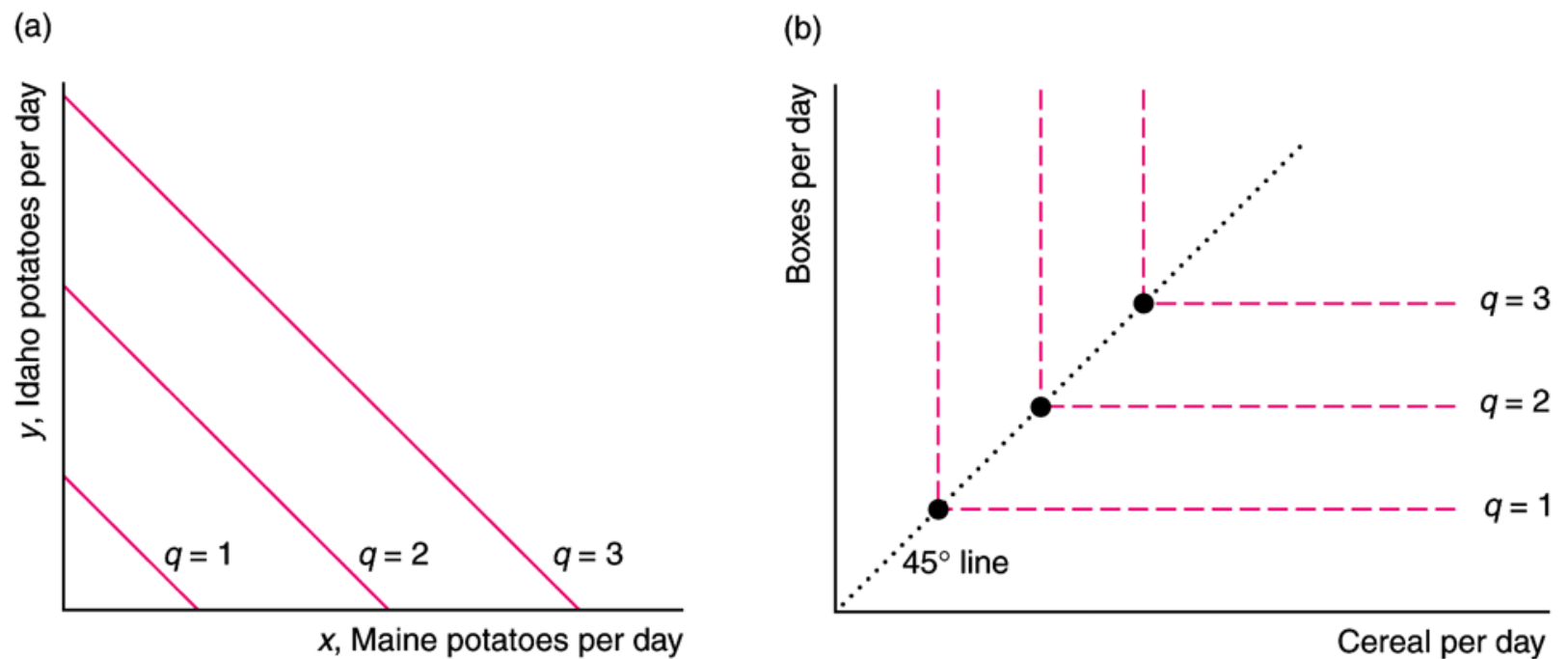


Figure 6.3c Substitutability of Inputs

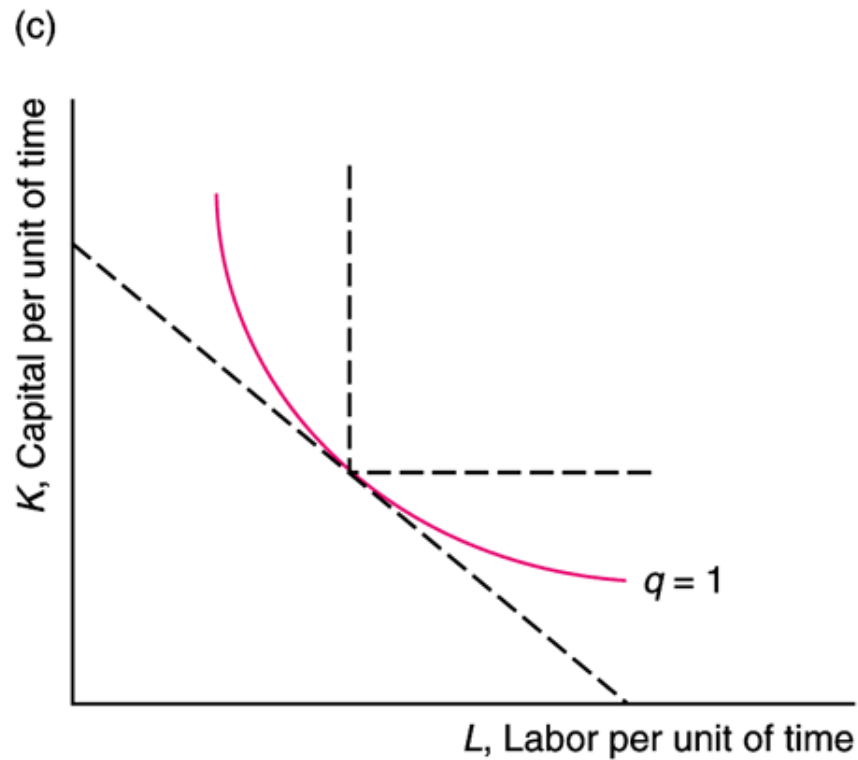
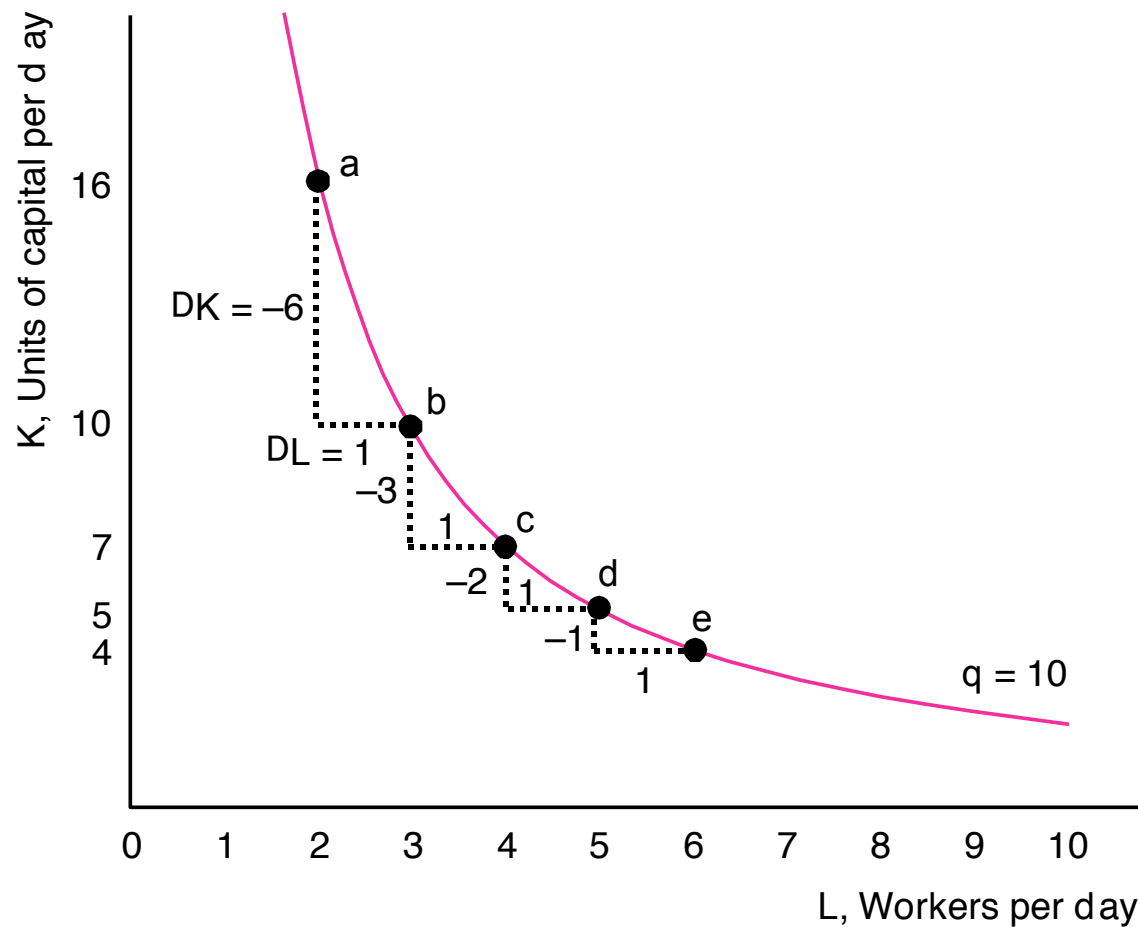


Figure 6.4 How the Marginal Rate of Technical Substitution Varies Along an Isoquant

MRTS in a Printing and Publishing U.S. Firm



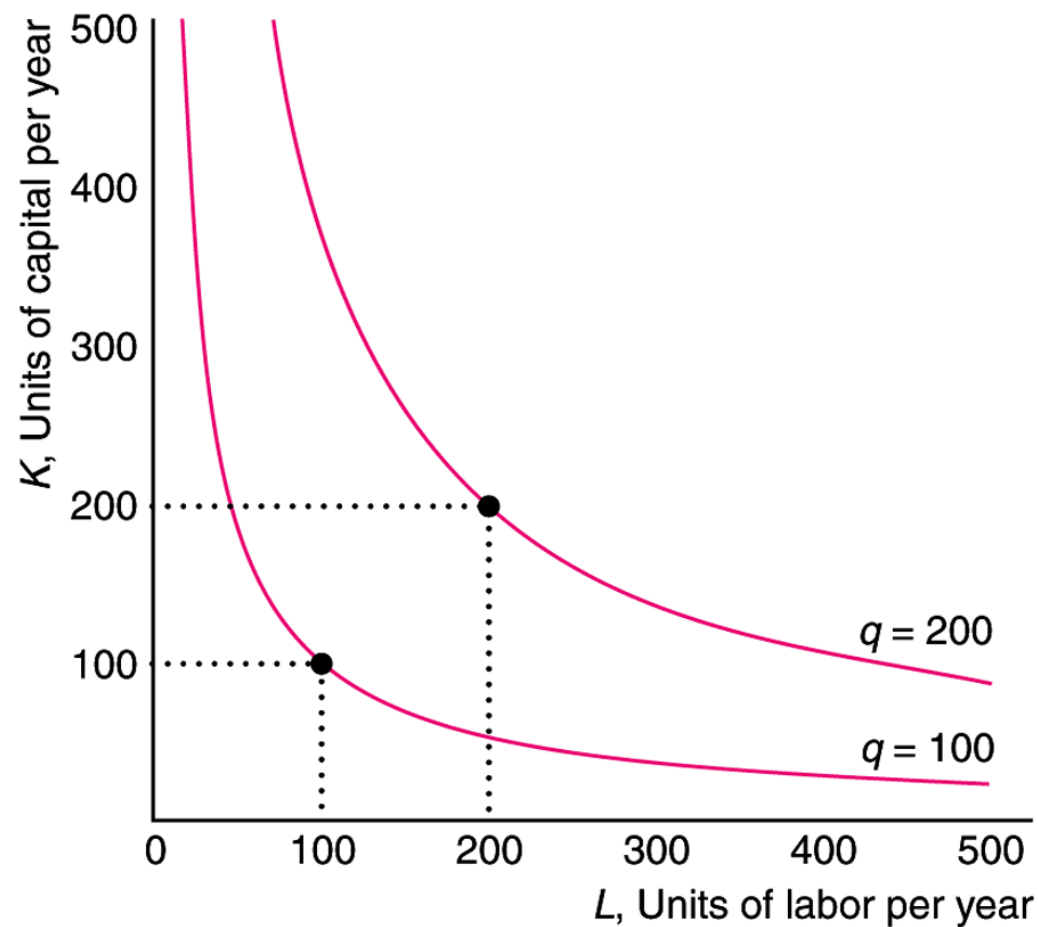


Application: Returns to Scale in U.S. Manufacturing

	Labor, α	Capital, β	Scale, $\gamma = \alpha + \beta$
<i>Decreasing Returns to Scale</i>			
Tobacco products	0.18	0.33	0.51
Food and kindred products	0.43	0.48	0.91
Transportation equipment	0.44	0.48	0.92
<i>Constant Returns to Scale</i>			
Apparel and other textile products	0.70	0.31	1.01
Furniture and fixtures	0.62	0.40	1.02
Electronic and other electric equipment	0.49	0.53	1.02
<i>Increasing Returns to Scale</i>			
Paper and allied products	0.44	0.65	1.09
Petroleum and coal products	0.30	0.88	1.18
Primary metal	0.51	0.73	1.24

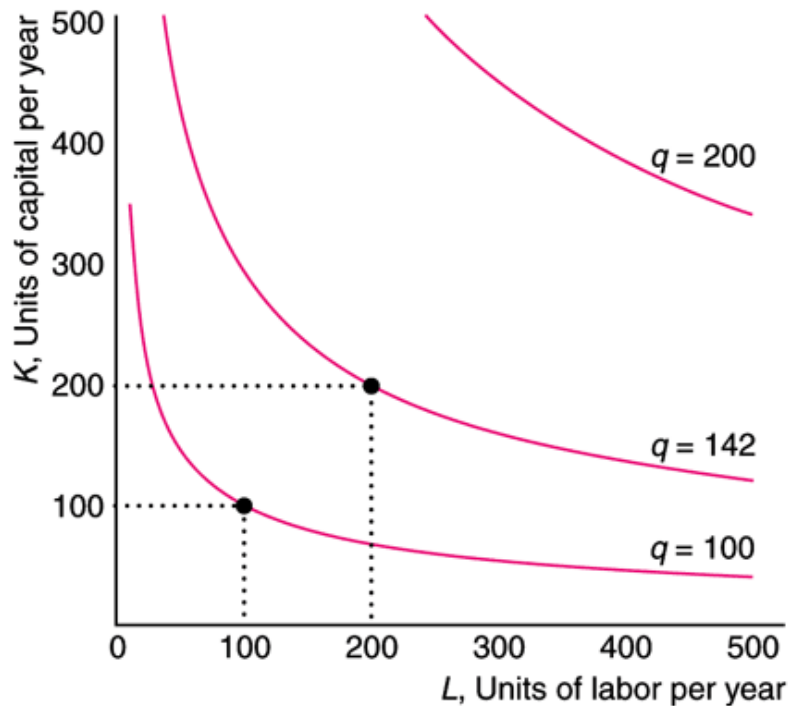
Application: Returns to Scale in U.S. Manufacturing

(a) Electronics and Equipment: Constant Returns to Scale



Application: Returns to Scale in U.S. Manufacturing

(b) Tobacco: Decreasing Returns to Scale



(c) Primary Metal: Increasing Returns to Scale

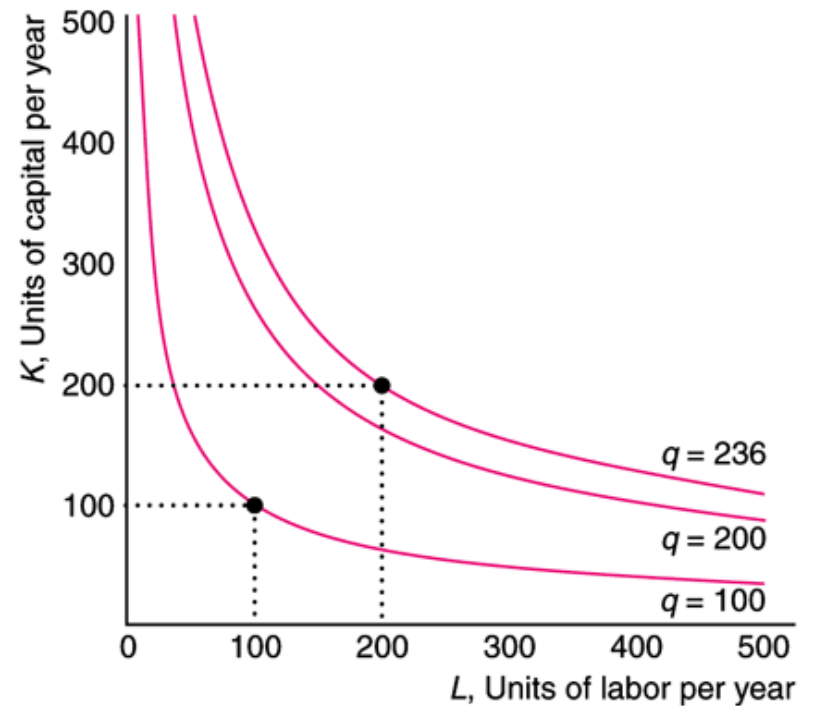


Figure 6.5 Varying Scale Economies

