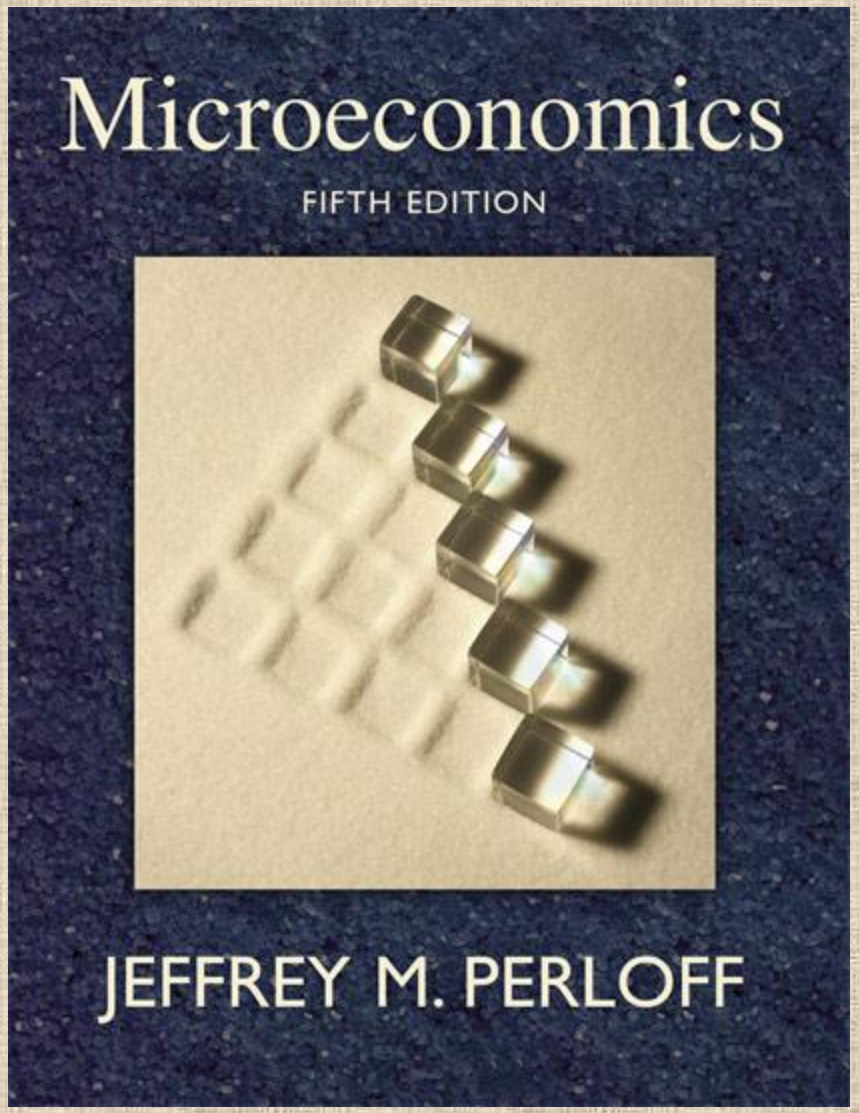


Chapter Five

Applying Consumer Theory

Topics

- Deriving Demand Curves.
- How Changes in Income Shift
- Demand Curves.
- Effects of a Price Change.
- Cost-of-Living Adjustments.
- Deriving Labor Supply Curves.

Figure 5.1 Deriving an Individual's Demand Curve

Budget Line, L

$$Qy = \frac{I}{P_y} - \frac{P_x}{P_y} Qx$$

Initial Values

P_x = price of X = \$12

P_y = price of Y = \$35

I = Income = \$419.

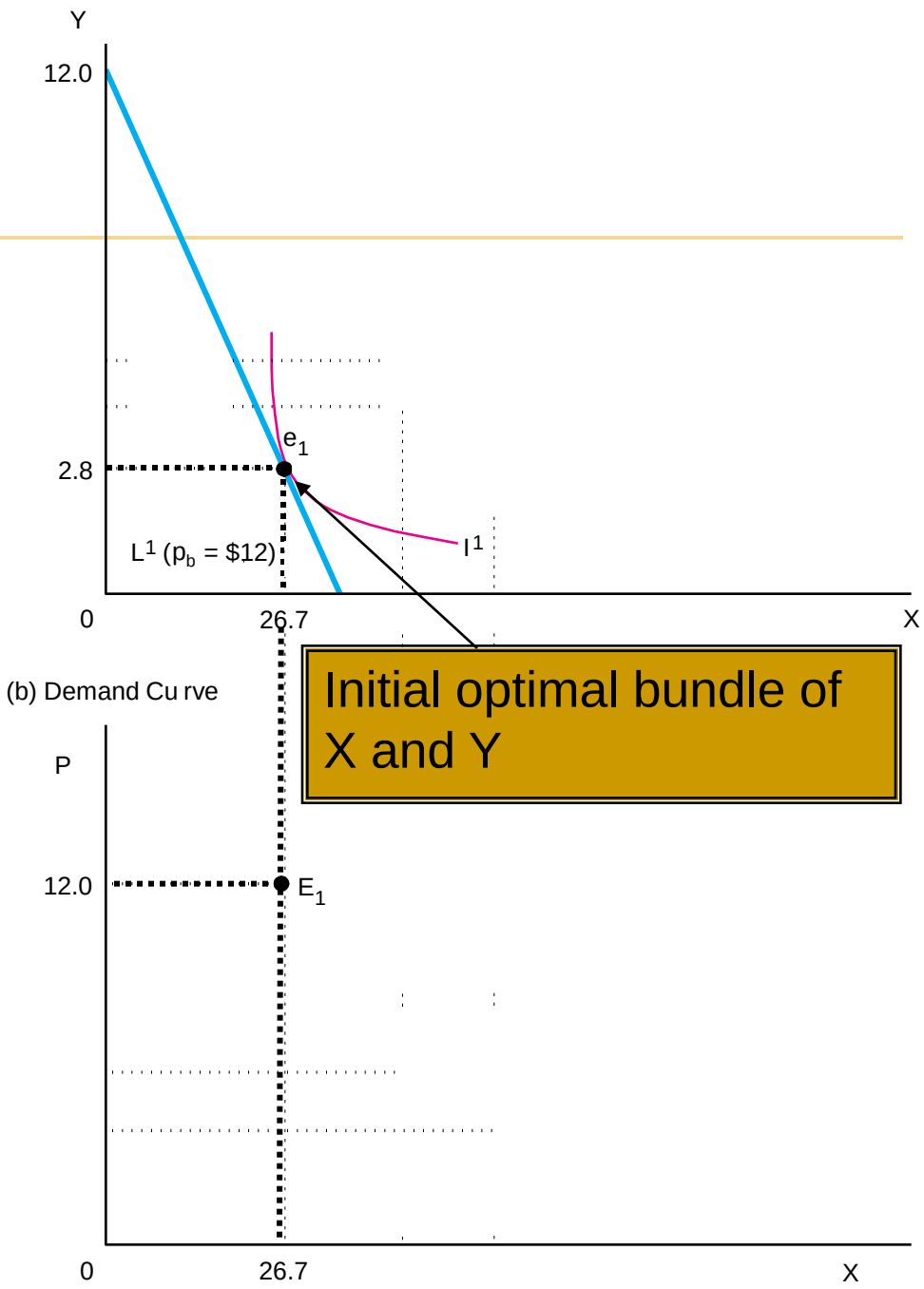


Figure 5.1 Deriving an Individual's Demand Curve

Budget Line, L

$$Qy = \frac{I}{P_y} - \frac{P_x}{P_y} Qx$$

New Values

P_x = price of X = $6

P_y = price of Y = $35

I = Income = $419.

Price of X goes down!

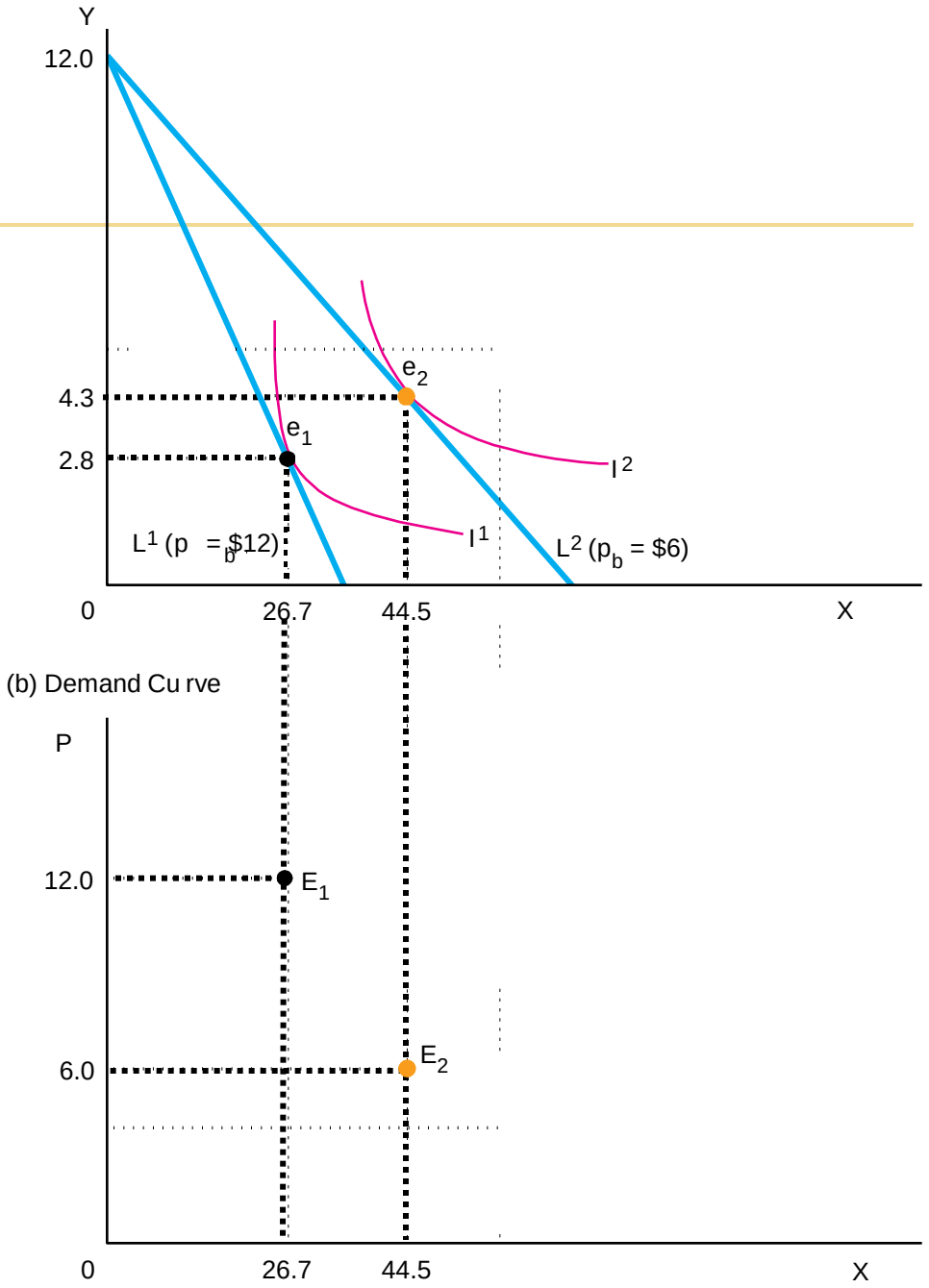


Figure 5.1 Deriving an Individual's Demand Curve

Budget Line, L

$$Qy = \frac{I}{P_y} - \frac{P_x}{P_y} Qx$$

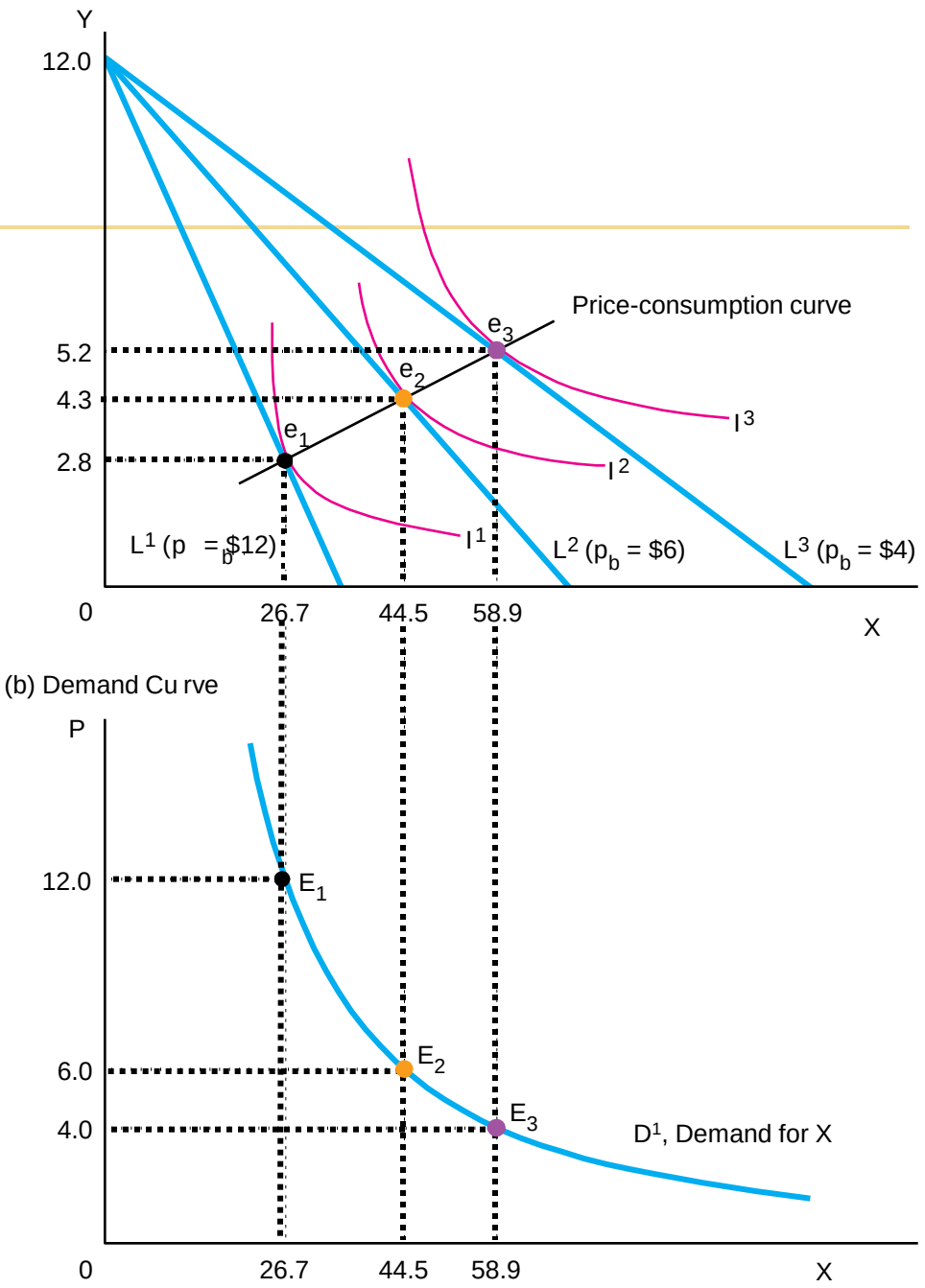
New Values

P_x = price of X = $4

P_Y = price of Y = $35

I = Income = $419.

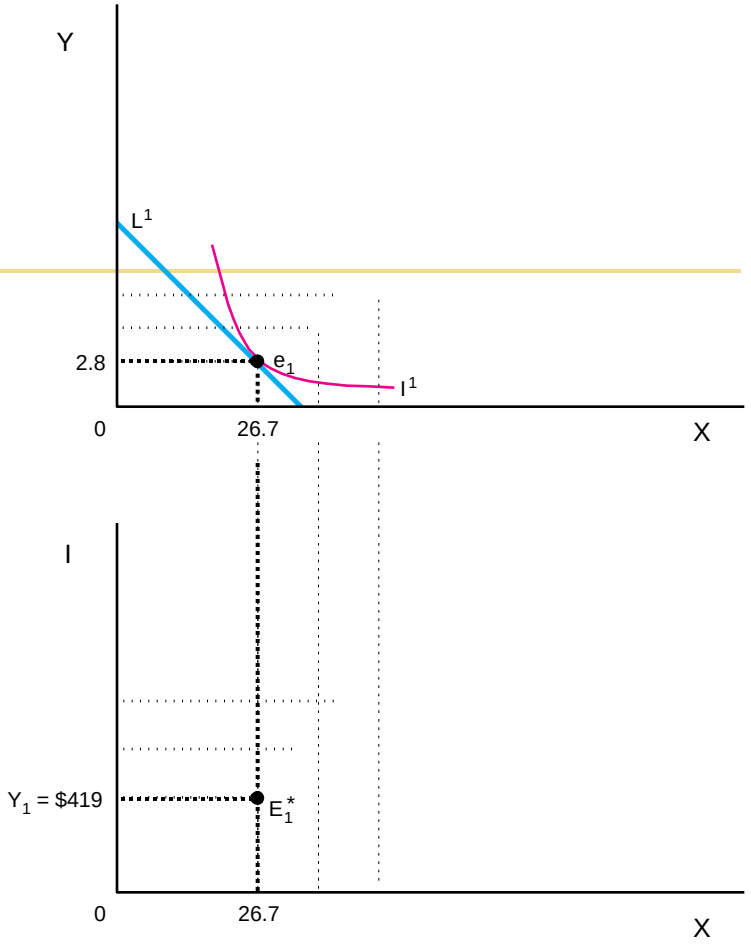
Price of X goes down again!



Effects of a Rise in Income

- **Engel curve** - the relationship between the quantity demanded of a single good and income, holding prices constant

Figure 5.2 Effect of a Budget Increase on an Individual's Demand Curve



Budget Line, L

$$Q_Y = \frac{I}{P_Y} - \frac{P_X}{P_Y} Q_X$$

Initial Values

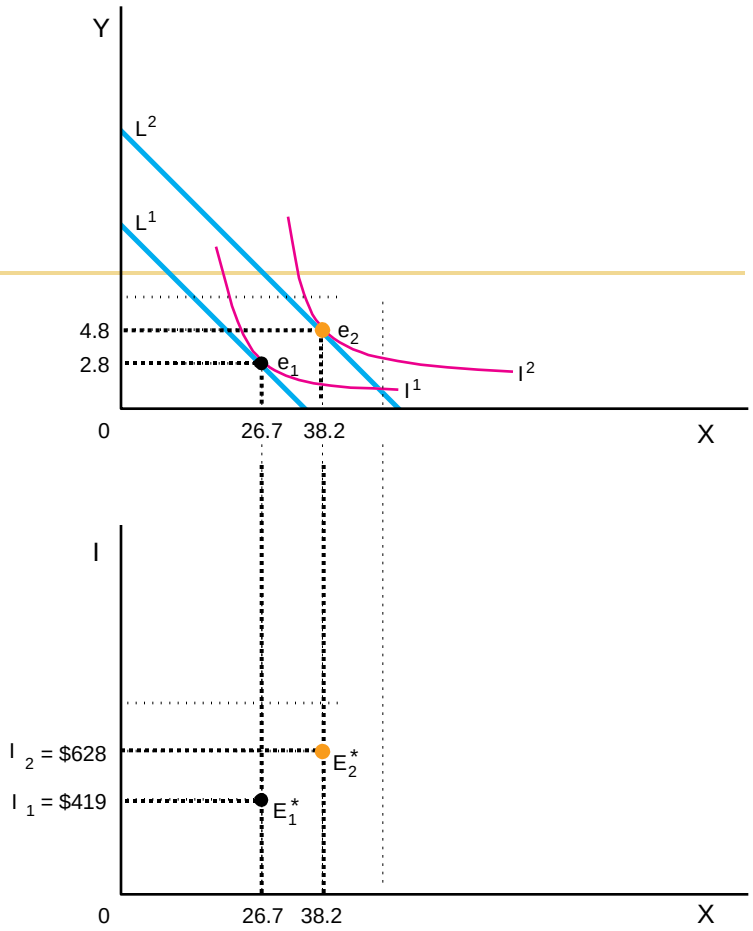
P_x = price of X = $12

P_y = price of Y = $35

I = Income = $628

Income goes up!

Figure 5.2 Effect of a Budget Increase on an Individual's Demand Curve



Budget Line, L

$$Q_Y = \frac{I}{P_Y} - \frac{P_X}{P_Y} Q_X$$

Initial Values

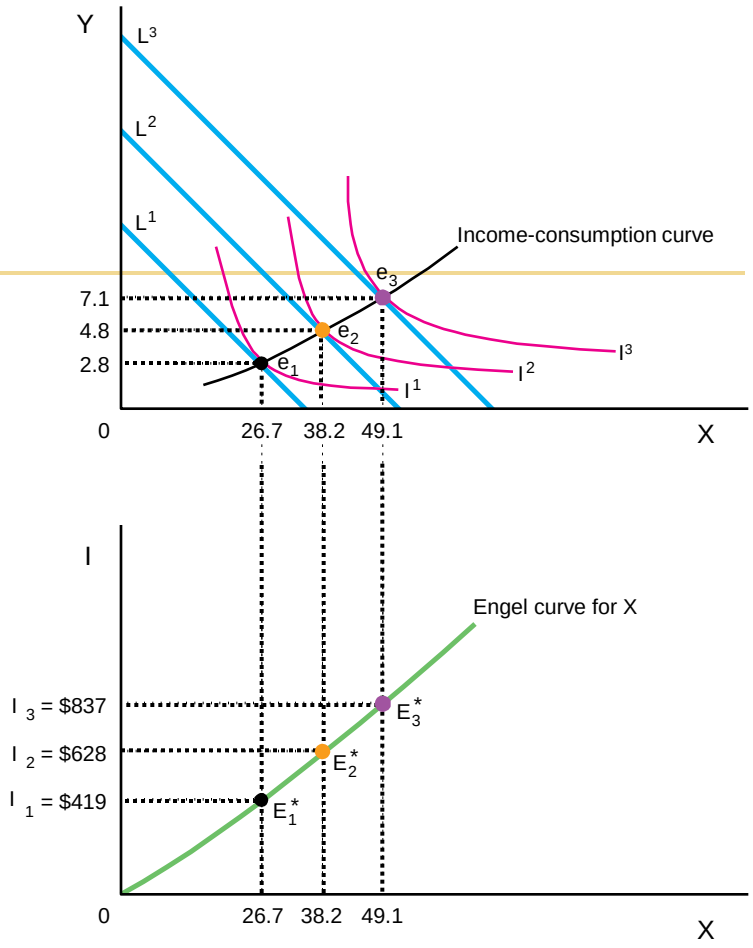
P_X = price of X = \$12

P_Y = price of Y = \$35

I = Income = \$628

Income goes up!

Figure 5.2 Effect of a Budget Increase on an Individual's Demand Curve



Budget Line, L

$$Q_Y = \frac{I}{P_Y} - \frac{P_X}{P_Y} Q_X$$

Initial Values

P_X = price of X = \$12

P_Y = price of Y = \$35

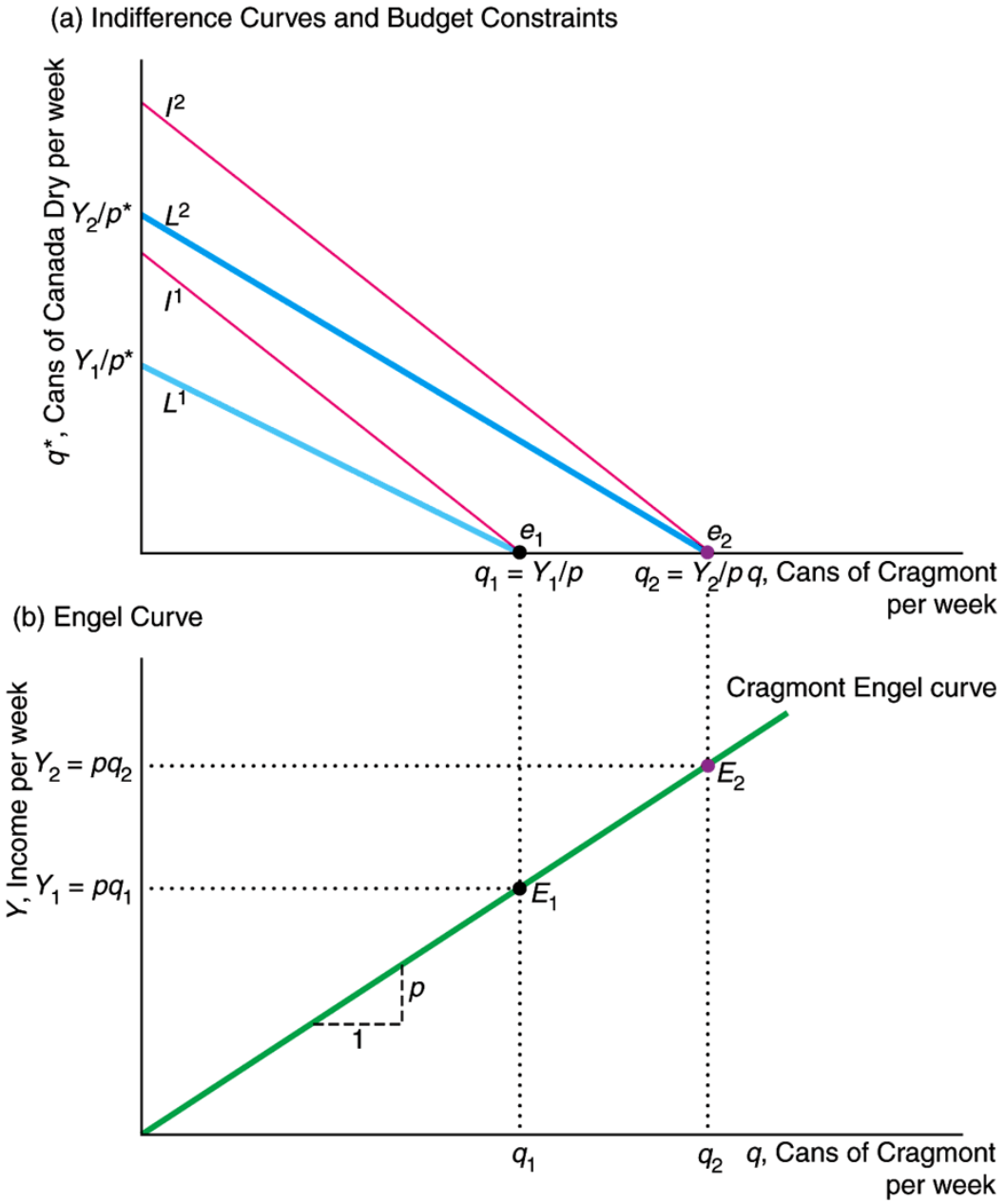
I = Income = \$837.

Income goes up again!

Solved Problem 5.1

- Mahdu views Cragmont and Canada Dry ginger ales as perfect substitutes: He is indifferent as to which one he drinks.The price of a 12-ounce can of Cragmont, p, is less than the price of a 12-ounce can of Canada Dry, p^*. What does Mahdu's Engel curve for Cragmont ginger ale look like? How much does his weekly ginger ale budget have to rise for Mahdu to buy one more can of Cragmont ginger ale per week?

Solved Problem 5.1



Consumer Theory and Income Elasticities.

- Formally,

$$\xi = \frac{\%\Delta Q}{\%\Delta Y} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta Y}{Y}} = \frac{\Delta Q}{\Delta Y}\frac{Y}{Q}$$

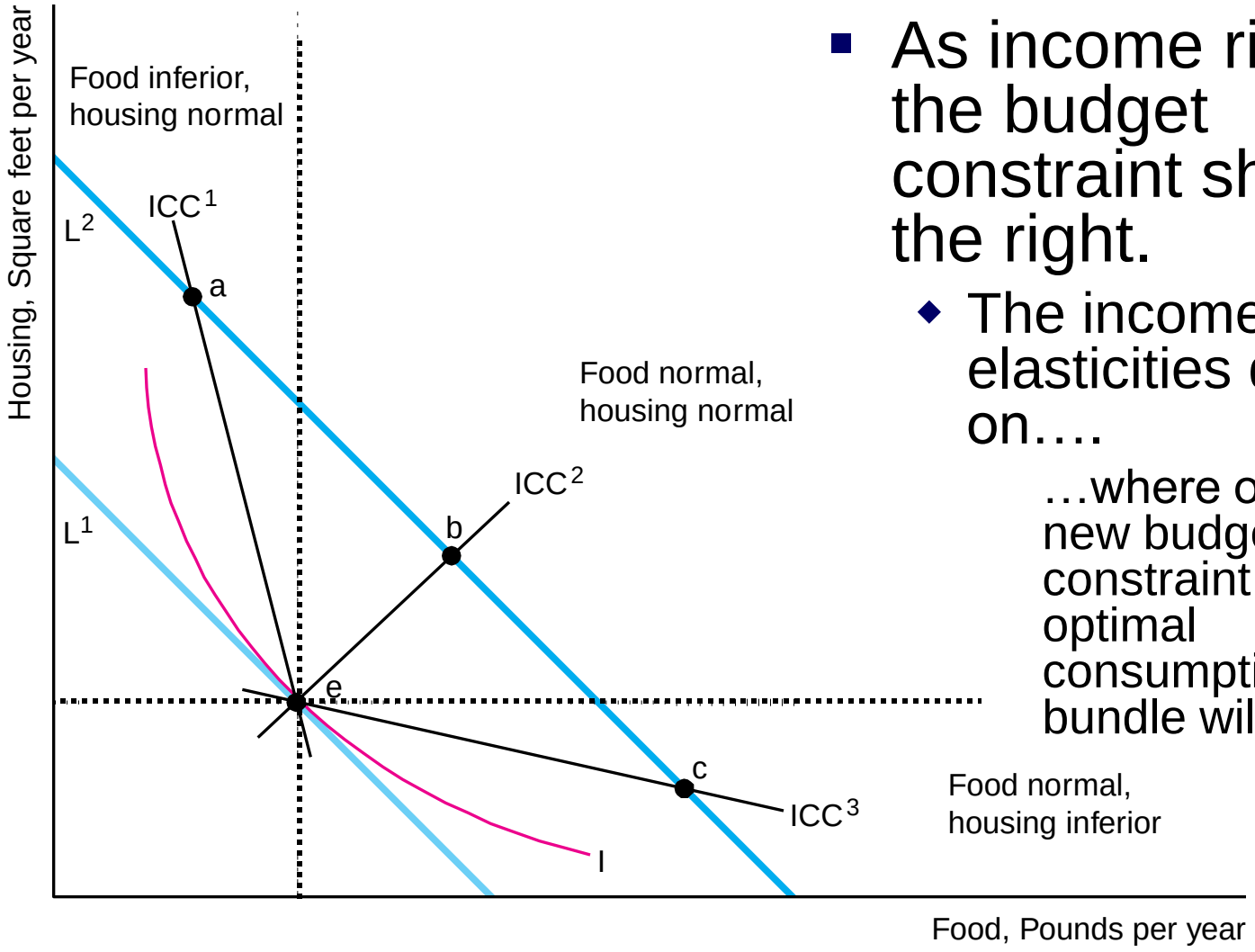
  - where Y stands for income.
- Example
  - If a 1% increase in income results in a 3% decrease in quantity demanded, the **income elasticity of demand** is ξ = -3%/1% = -3.

Consumer Theory and Income Elasticities

- **normal good -** a commodity of which as much or more is demanded as income rises
  - Positive income elasticity

- **inferior good -** a commodity of which less is demanded as income rises
  - Negative income elasticity

Figure 5.3 Income-Consumption Curves and Income Elasticities

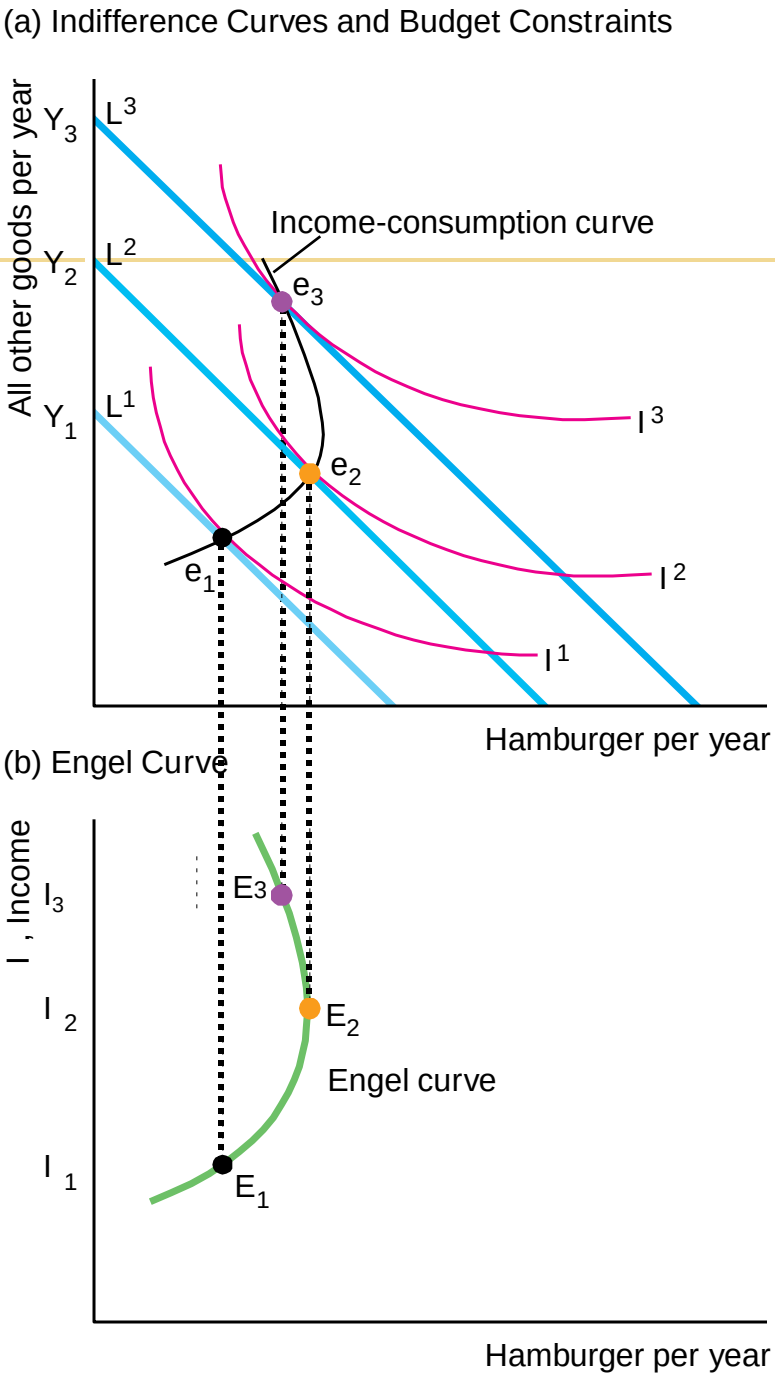


- As income rises the budget constraint shifts to the right.
  - The income elasticities depend on….

    …where on the new budget constraint the new optimal consumption bundle will be

Figure 5.4 A Good That Is Both Inferior and Normal

- When Gail was poor and her income increased..
  - …she bought more hamburger
- But as she became wealthier and her income rose…
  - ….she bought less hamburger and more steak.

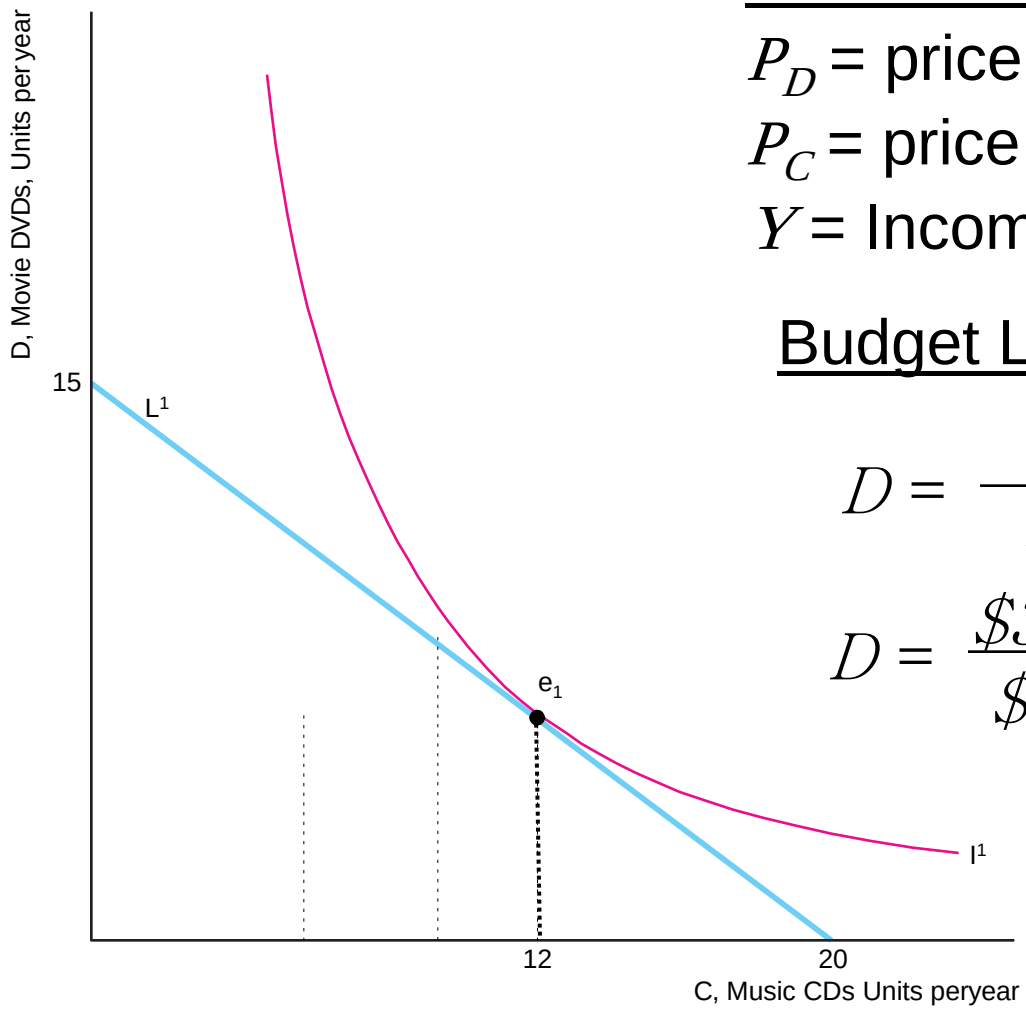


Effects of a Price Change

- **substitution effect -** the change in the quantity of a good that a consumer demands when the good's price changes, holding other prices and the consumer's utility constant.

- **income effect -** the change in the quantity of a good a consumer demands because of a change in income, holding prices constant.

Figure 5.5 Substitution and Income Effects with Normal Goods



Initial Values

P_D = price of DVDs = \$20

P_C = price of CDs = \$15

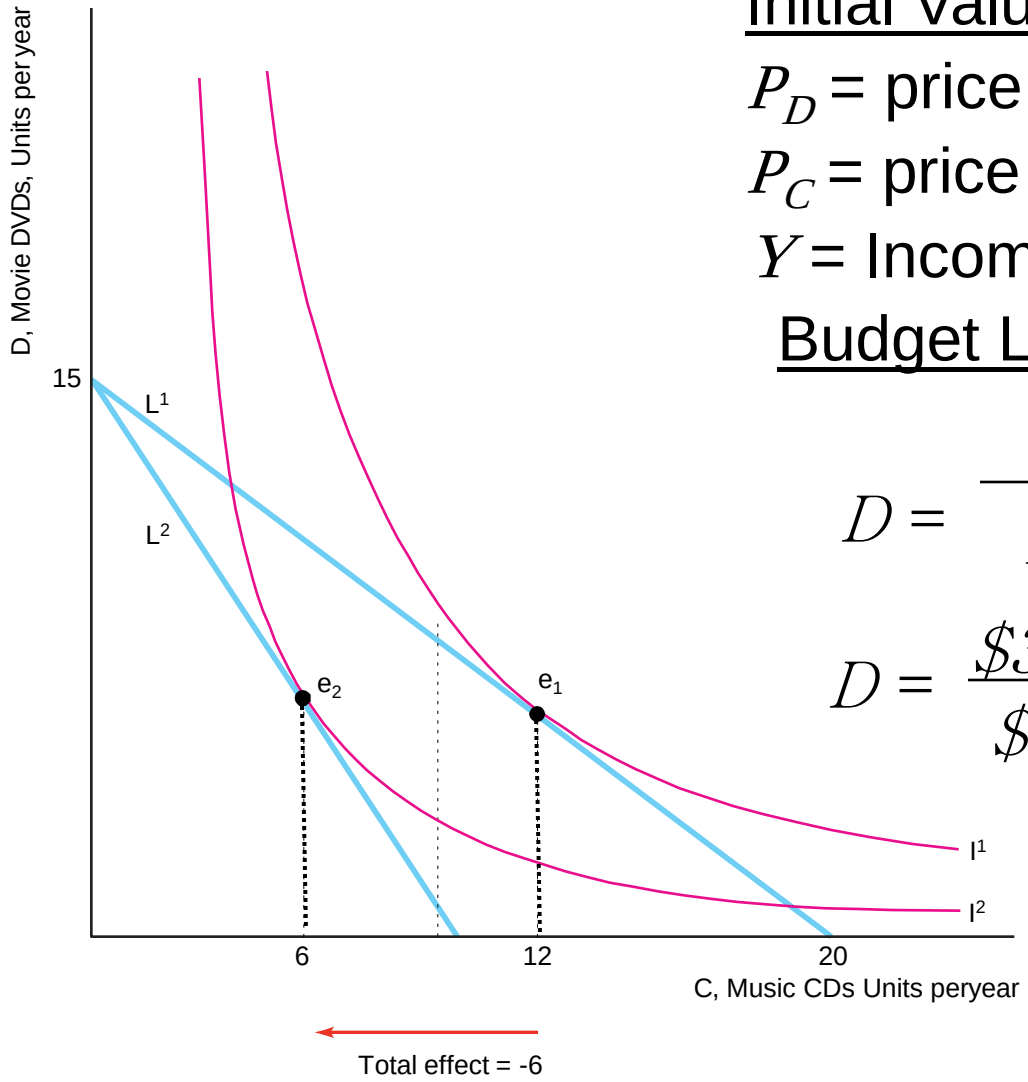
Y = Income = \$300.

Budget Line, L

$$D = \frac{Y}{P_D} - \frac{P_C}{P_D} C$$

$$D = \frac{\$300}{\$20} - \frac{\$15}{\$20} C$$

Figure 5.5 Substitution and Income Effects with Normal Goods



Initial Values

P_D = price of DVDs = \$20

P_C = price of CDs = \$15

Y = Income = \$300.

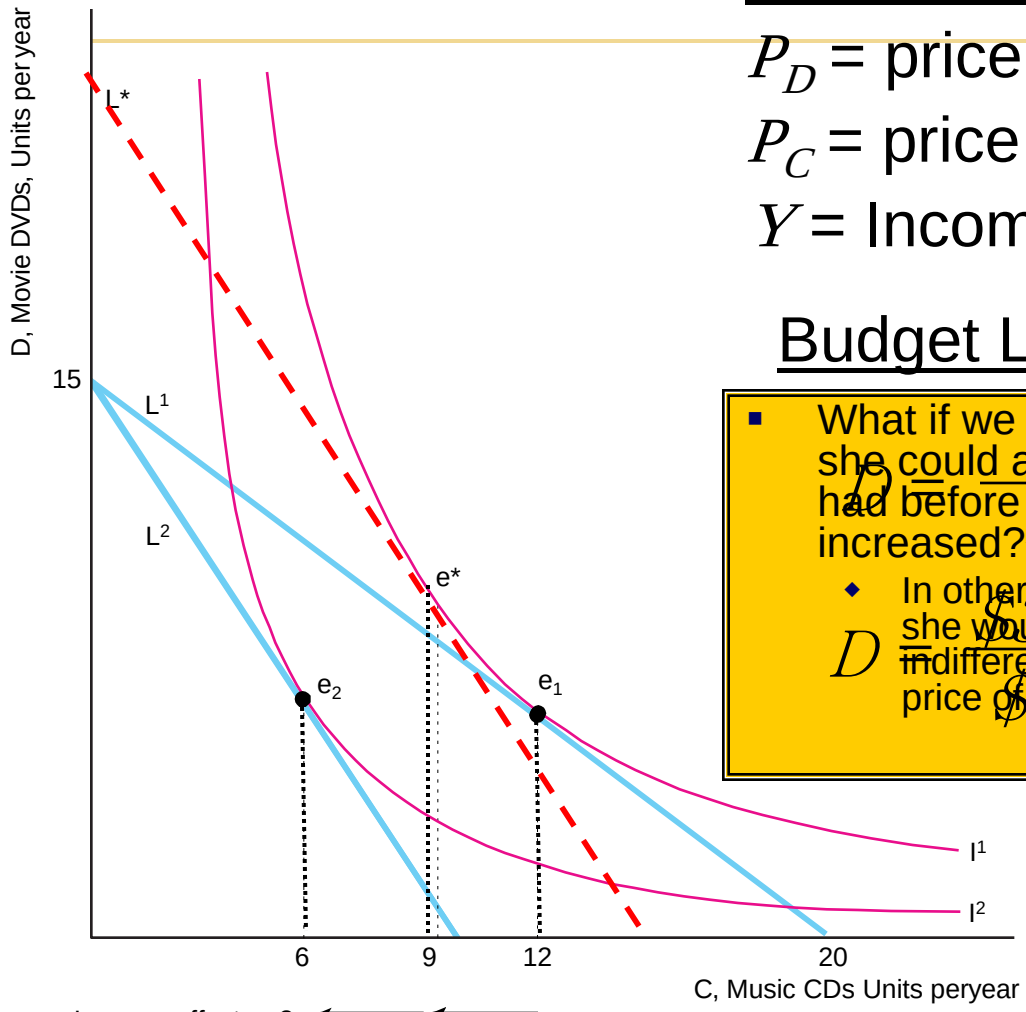
Budget Line, L

$$D = \frac{Y}{P_D} - \frac{P_C}{P_D} C$$

$$D = \frac{\$300}{\$20} - \frac{\$15}{\$20} C$$

P_C goes up…

Figure 5.5 Substitution and Income Effects with Normal Goods



Initial Values

P_D = price of DVDs = $20

P_C = price of CDs = $15

Y = Income = $300.

Budget Line, L

$$D = \frac{\$300}{\$20} - \frac{\$30}{\$20} C$$

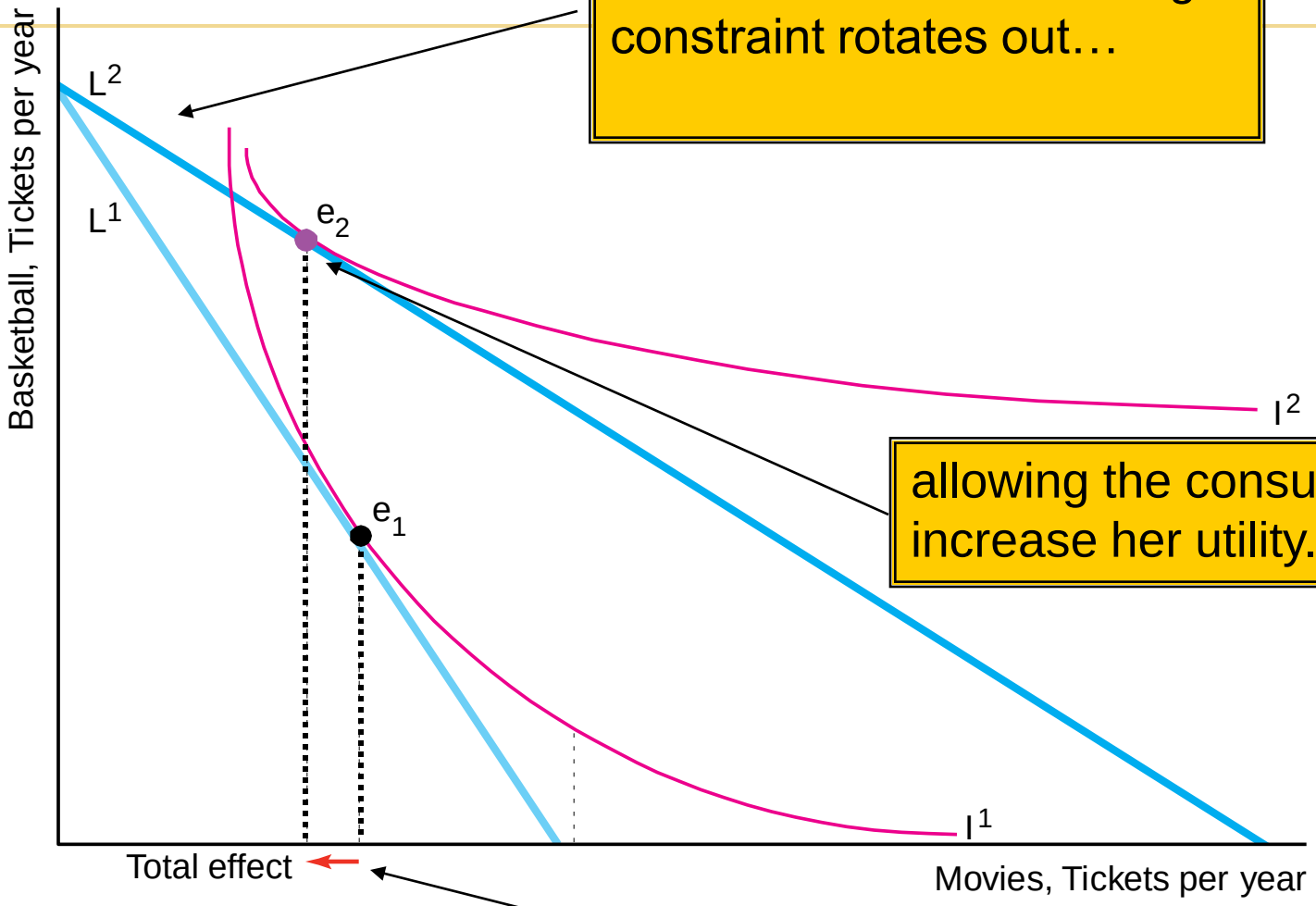
- What if we compensated Laura so she could afford the same utility she had before the price of CDs increased?
  - In other words, how much income she would need to afford indifference curve I^1, with the new price of CDs ($30)

$$D = \frac{Y}{P_D} - \frac{P_C}{P_D} C$$

$$D = \frac{\$300}{\$20} - \frac{\$30}{\$20} C$$

Figure 5.6 Giffen Good

When the price of movie tickets decreases the budget constraint rotates out…

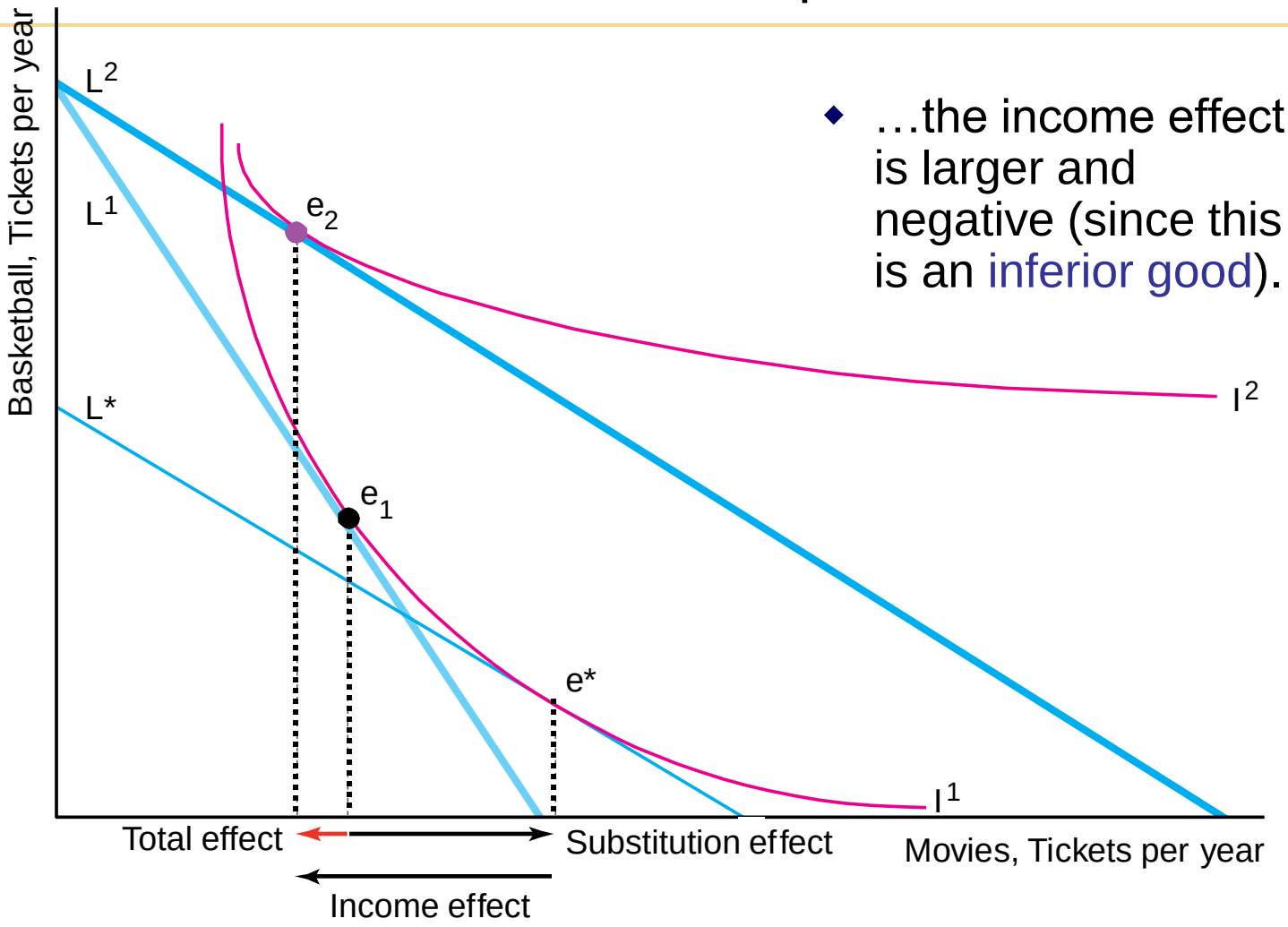


allowing the consumer to increase her utility.

Nevertheless, the total effect is negative. WHY?

Figure 5.6 Giffen Good

- Even though the substitution effect is positive….
  - …the income effect is larger and negative (since this is an inferior good).



Inflation Indexes

- *Inflation* - the increase in the overall price level over time.
  - *nominal price* - the actual price of a good.
  - *real price* - the price adjusted for inflation.

- How do we adjust for inflation to calculate the real price?

Inflation Indexes (cont.)

- Consumer Price Index (CPI) – measure the cost of a standard bundle of goods for use in comparing prices over time.
  - We can use the CPI to calculate the real price of a hamburger over time.
  - In terms of 2008 dollars, the real price of a hamburger in 1955 was:

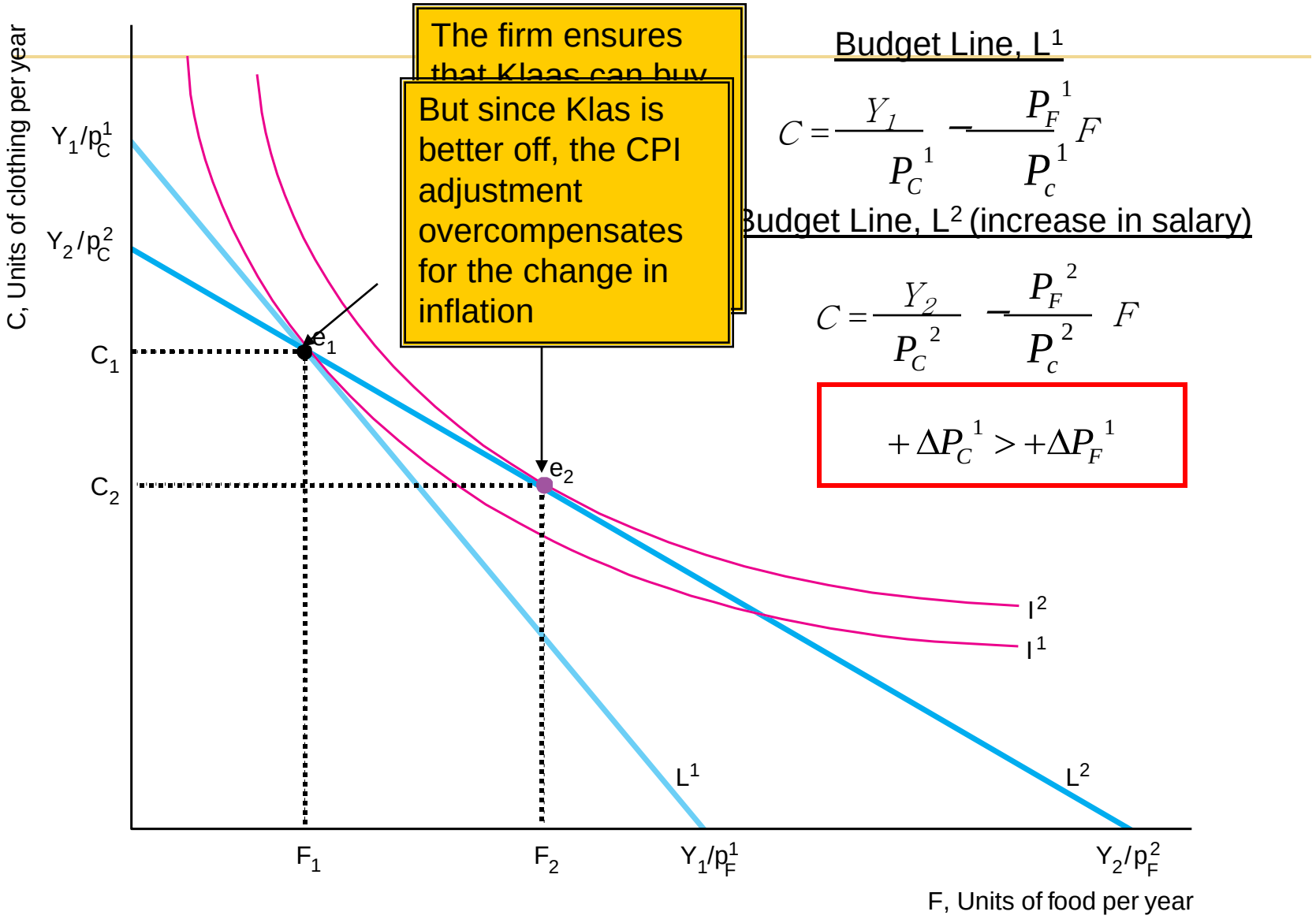
$$\frac{\text{CPI for 2008}}{\text{CPI for 2005}} \times \text{price of a burger} = \frac{211.1}{26.8} \times 15 = 1.18$$

Effects of Inflation Adjustments

- Scenario: Klaas signed a long-term contract when he was hired. According to the COLA clause in his contract, his employer increases his salary each year by the same percentage as that by which the CPI increases. If the CPI this year is 5% higher than the CPI last year, Klaas's salary rises automatically by 5% over last year's.

- Question: what is the difference between using the CPI to adjust the long-term contract and using a true cost-of-living adjustment, which holds utility constant?

Figure 5.7 The Consumer Price Index

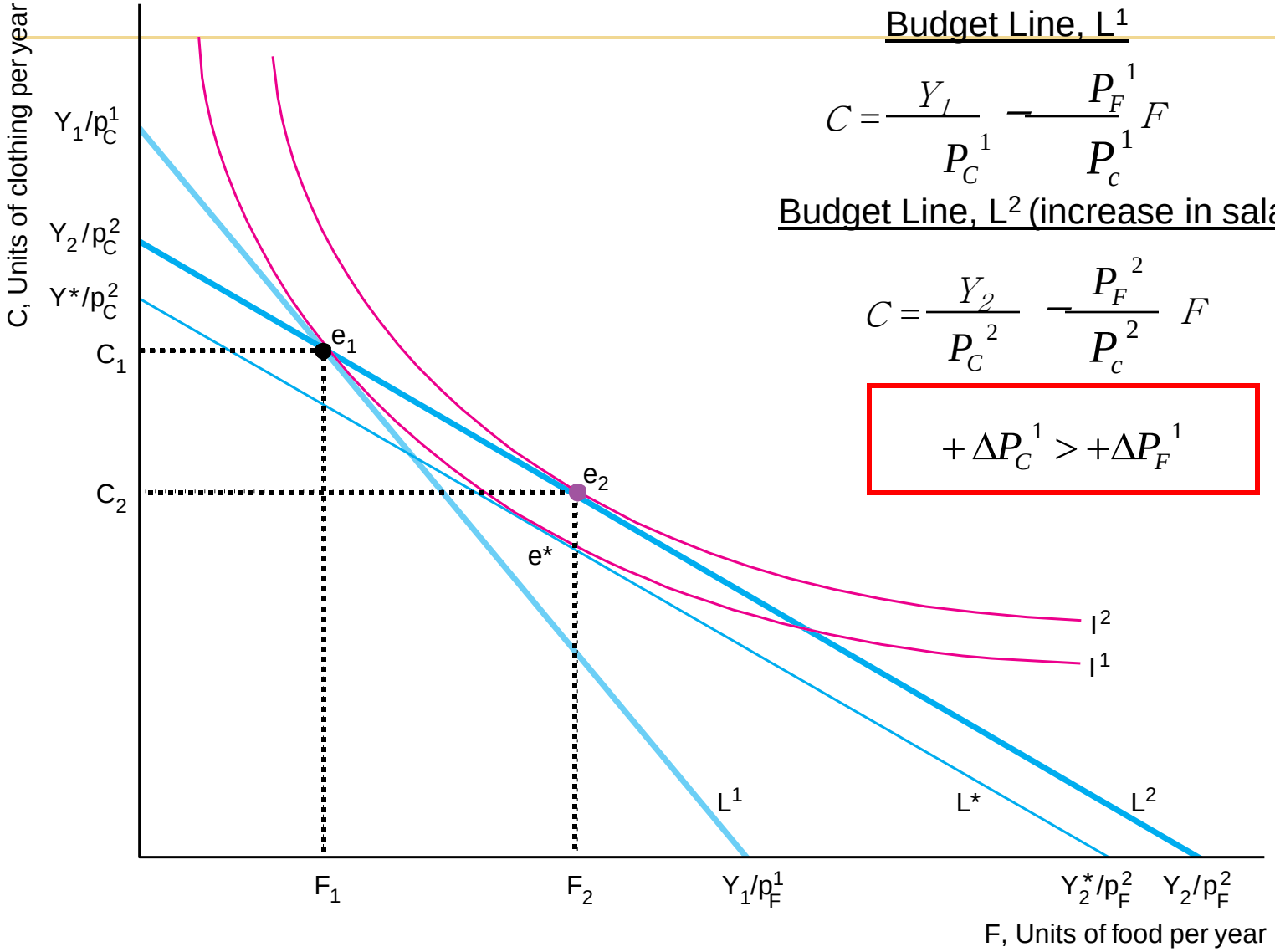


True Cost-of-Living Adjustment

- *True cost-of-living index* - an inflation index that holds utility constant over time.

- Question: how big an increase in Klaas's salary would leave him exactly as well off in the second year as in the first?

True Cost-of-Living Adjustment



Budget Line, L^1

$$C = \frac{Y_1}{P_C^1} - \frac{P_F^1}{P_c^1} F$$

Budget Line, L^2 (increase in salary)

$$C = \frac{Y_2}{P_C^2} - \frac{P_F^2}{P_c^2} F$$

$$+\Delta P_C^1 > +\Delta P_F^1$$

Table 5.1 Cost-of-Living Adjustments

	p_C	p_F	Income, Y	Clothing	Food	Utility, U
First year	\$1	\$4	$Y_1 = \$400$	200	50	2,000
Second year	\$2	\$5				
No adjustment			$Y_1 = \$400$	100	40	≈1,265
CPI adjustment			$Y_2 = \$650$	162.5	65	≈2,055
True COLA			$Y^* \approx \$632.50$	≈158.1	≈63.2	2,000

Labor-Leisure Choice

- *Leisure* - all time spent not working.
- The number of hours worked per day, H, equals 24 minus the hours of leisure or nonwork, N, in a day:

$$H = 24 - N.$$

  - The price of leisure is forgone earnings.

    The higher your wage, the more an hour of leisure costs you.

Labor-Leisure Choice: Example

- *Jackie spends her total income, Y, on various goods.*
  - *The price of these goods is $1 per unit.*
- *Her utility, U, depends on how many goods and how much leisure she consumes:*

$$U = U(Y, N).$$

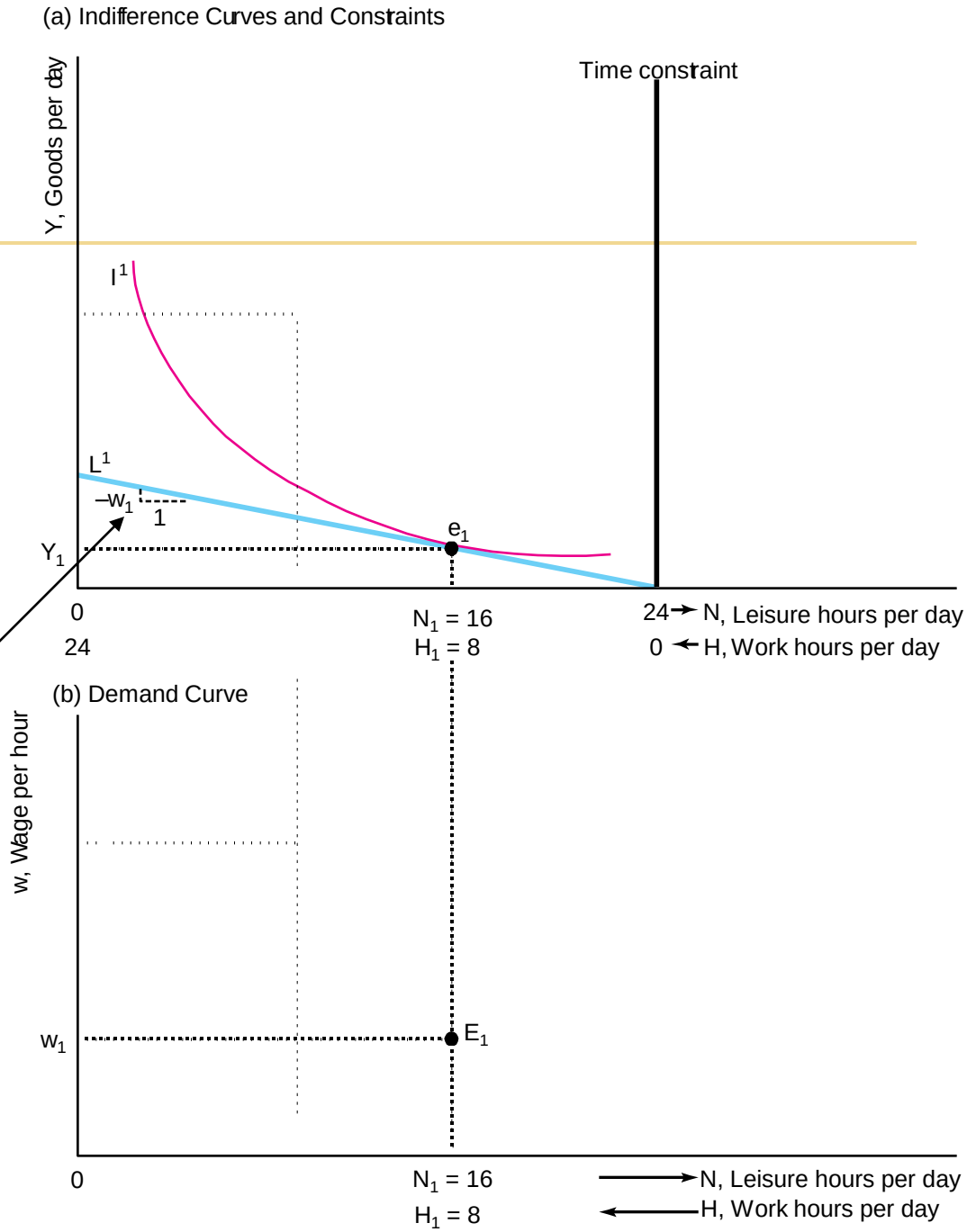
- *Jackie's earned income equal:*

$$wH.$$

- *And her total income, Y, is her earned income plus her unearned income, Y^*:*

$$Y = wH + Y^*.$$

Figure 5.8 Demand for Leisure



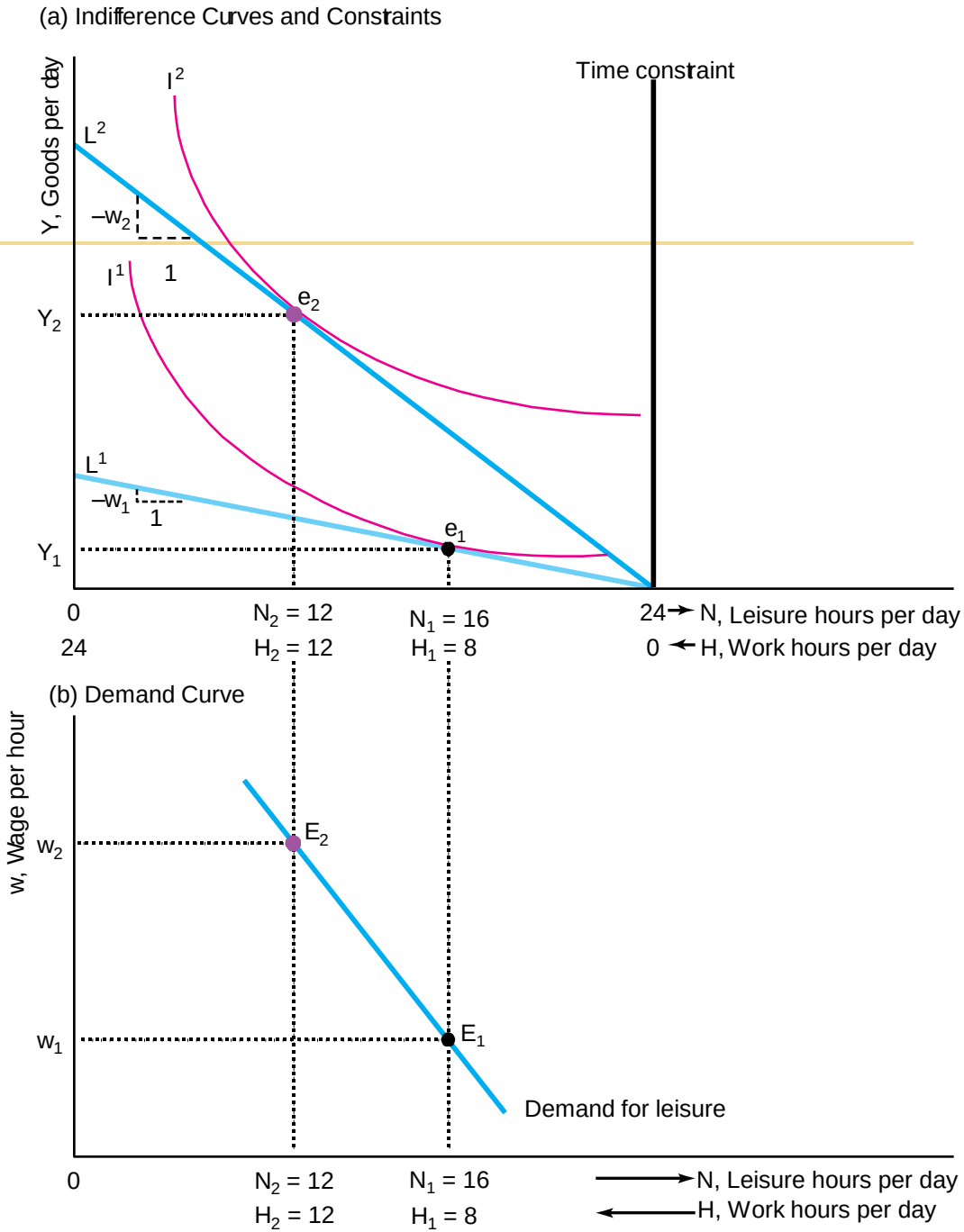
Budget Line, L^1

$$Y = w_1 H$$

$$Y = w_1(24 - N).$$

Each extra hour of leisure she consumes costs her w_1 goods.

Figure 5.8 Demand for Leisure



Budget Line, L^1

$$Y = w_1 H$$

$$Y = w_1(24 - N).$$

Budget Line, L^2

$$Y = w_2 H$$

$$Y = w_2(24 - N).$$

$$w_2 > w_1$$

Figure 5.9 Supply Curve of Labor

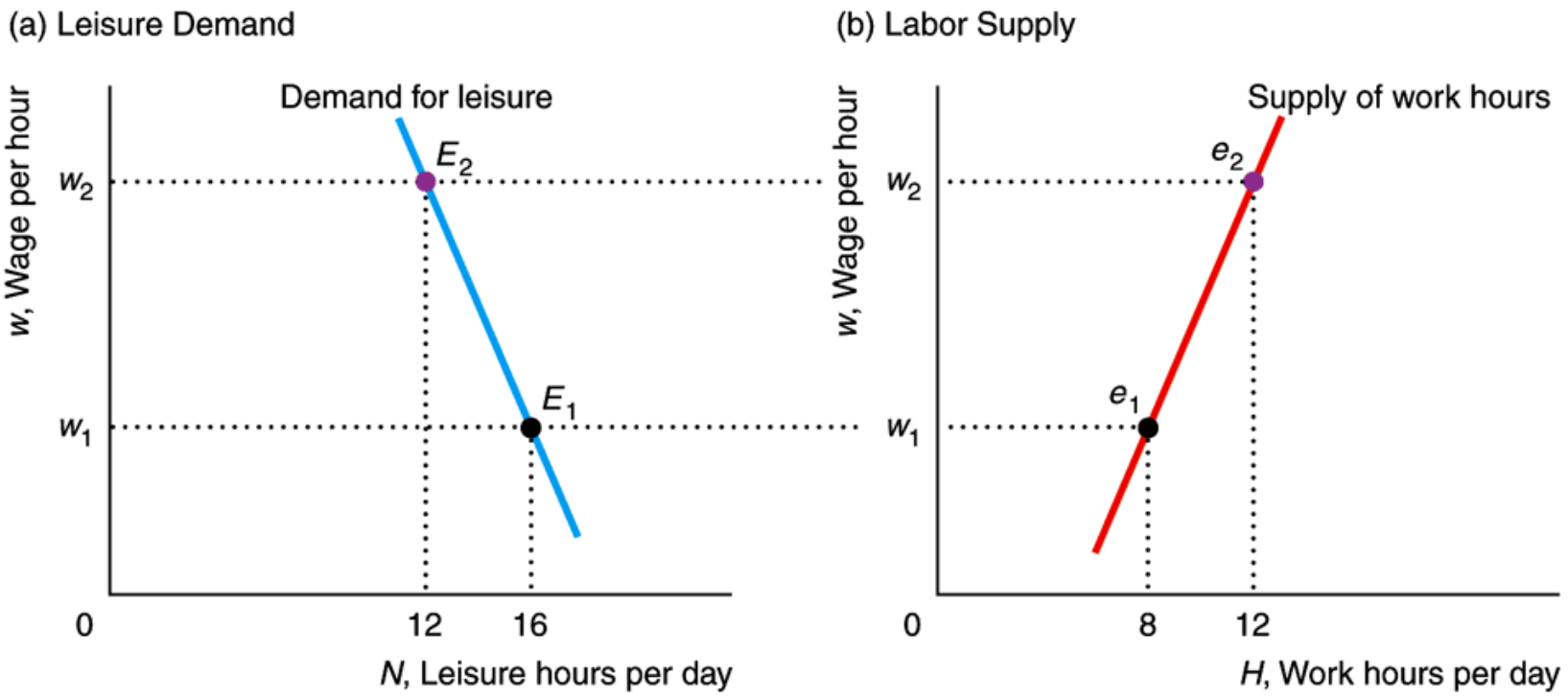
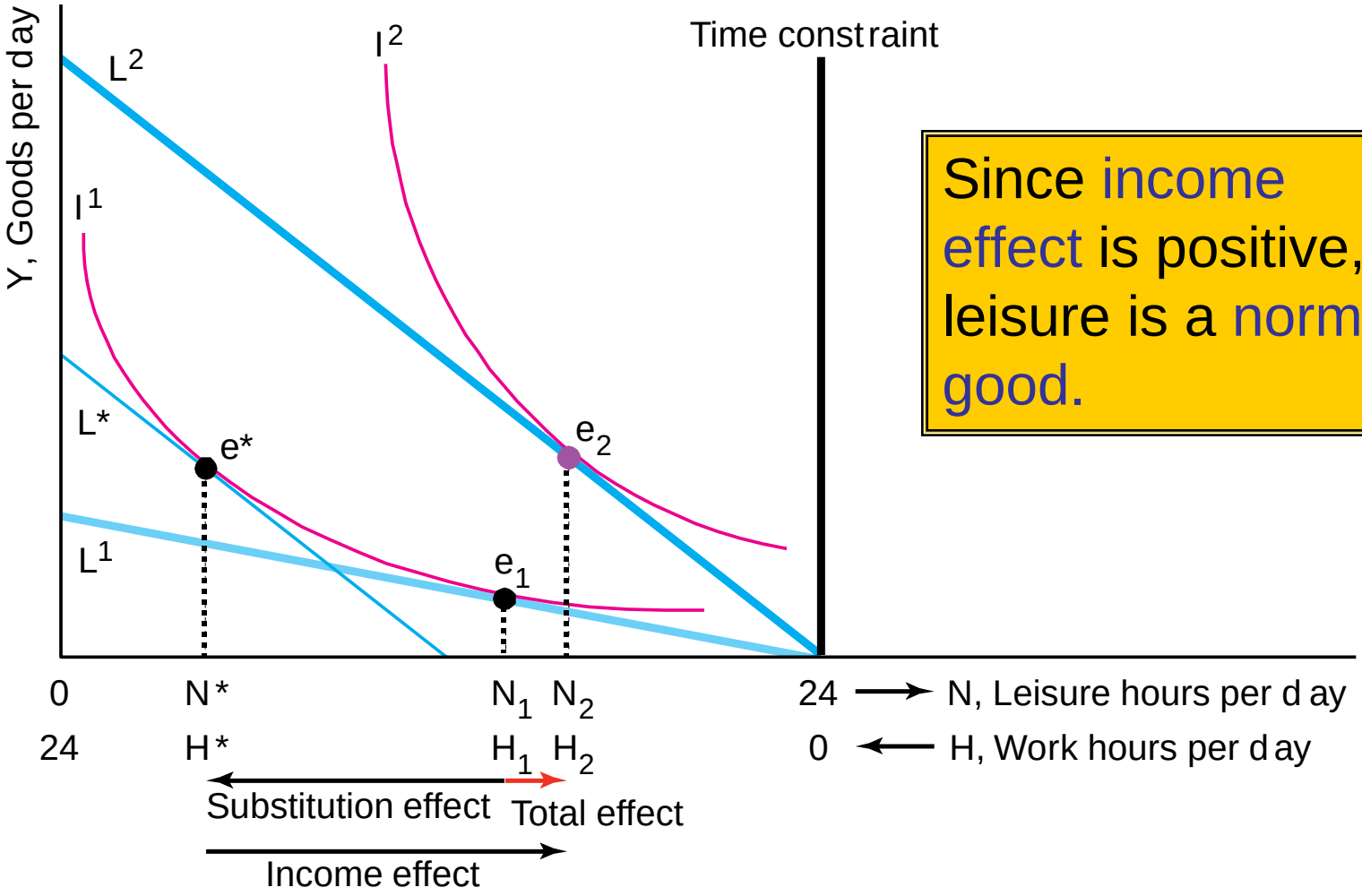


Figure 5.10 Income and Substitution Effects of a Wage Change

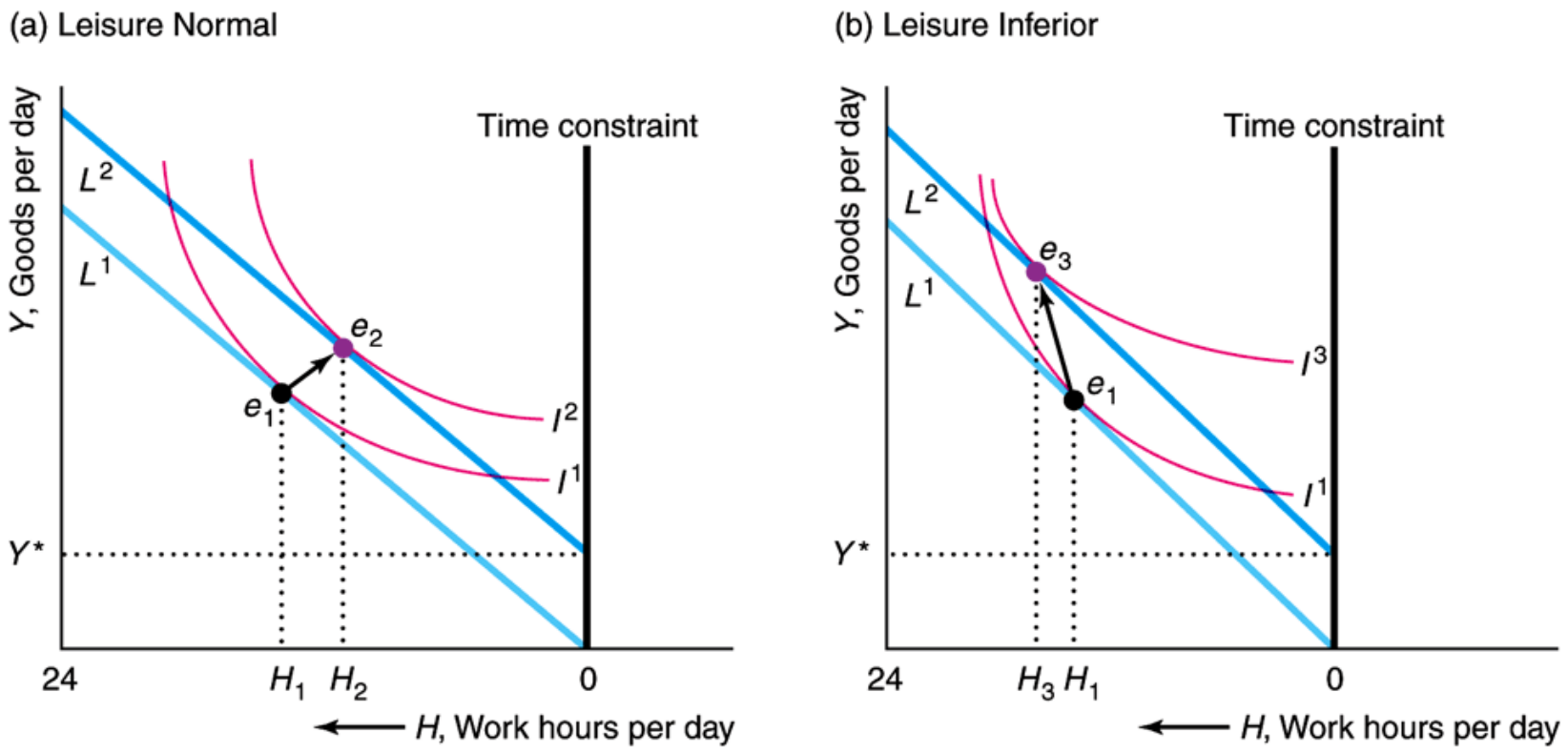


Since income effect is positive, leisure is a normal good.

Solved Problem 5.3

- Enrico receives a no-strings-attached scholarship that pays him an extra Y^* per day. How does this scholarship affect the number of hours he wants to work? Does his utility increase?

Solved Problem 5.3



Application Leisure-Income Choices of Textile Workers

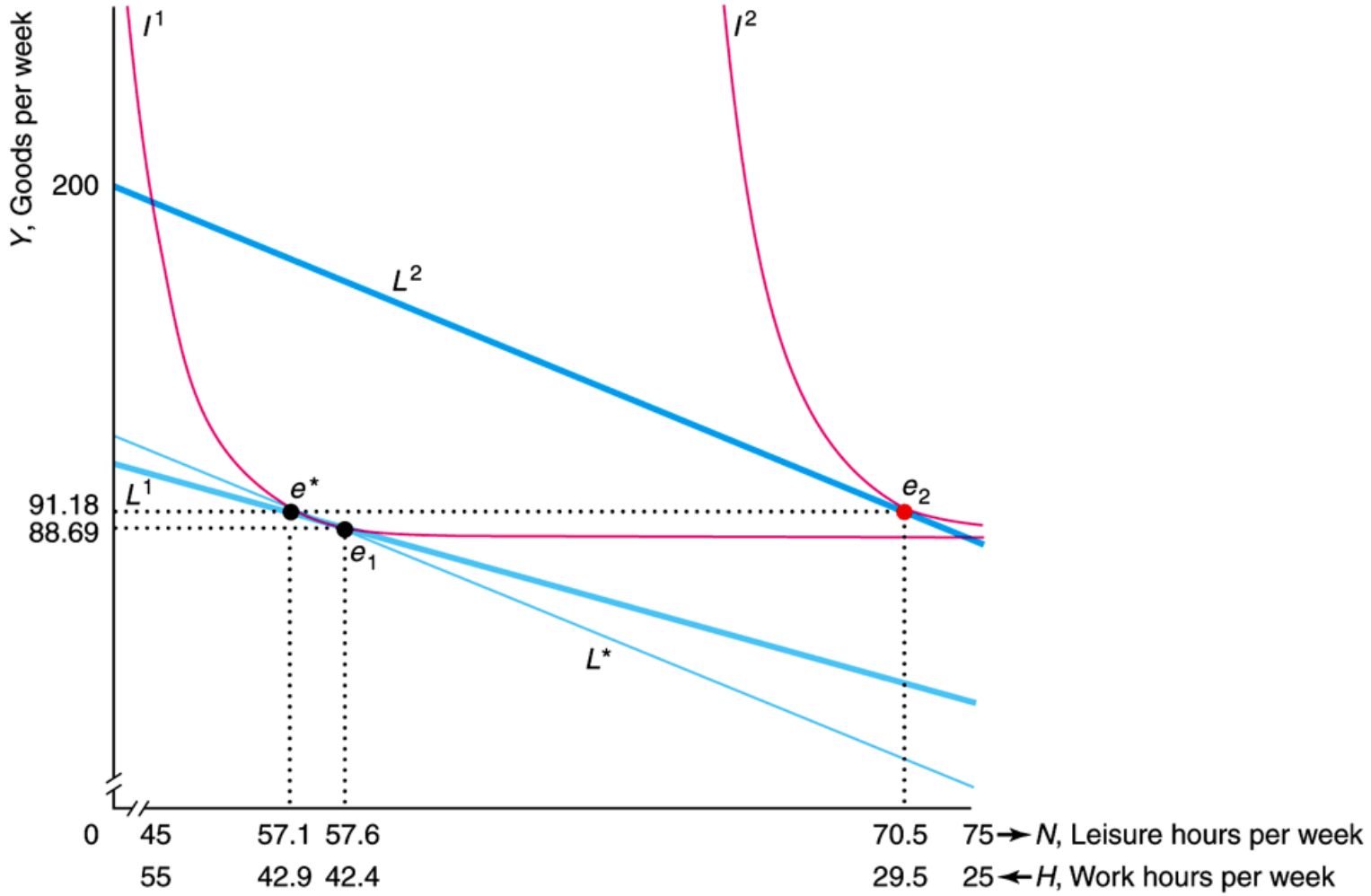


Figure 5.11 Labor Supply Curve That Slopes Upward and Then Bends Backward

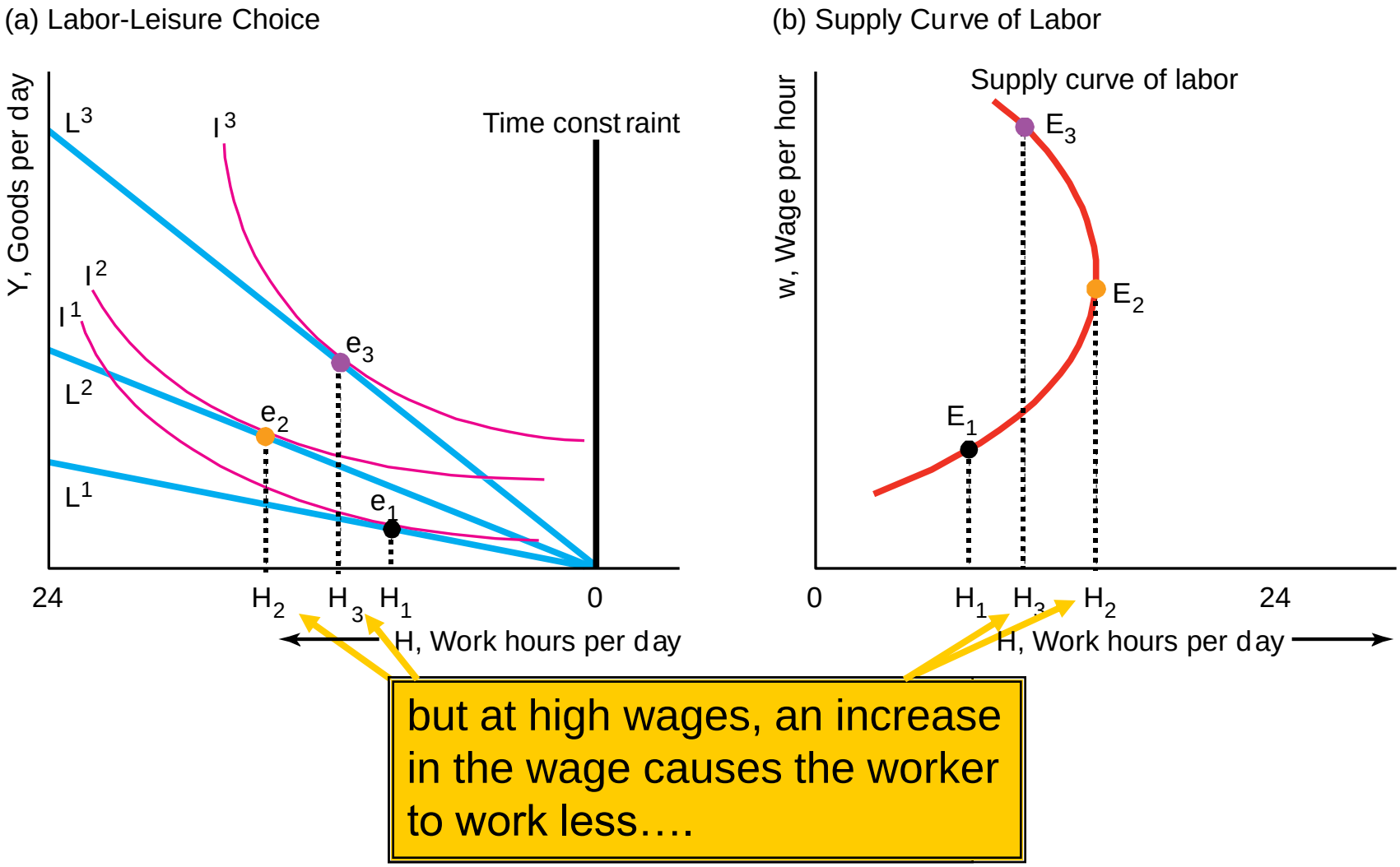
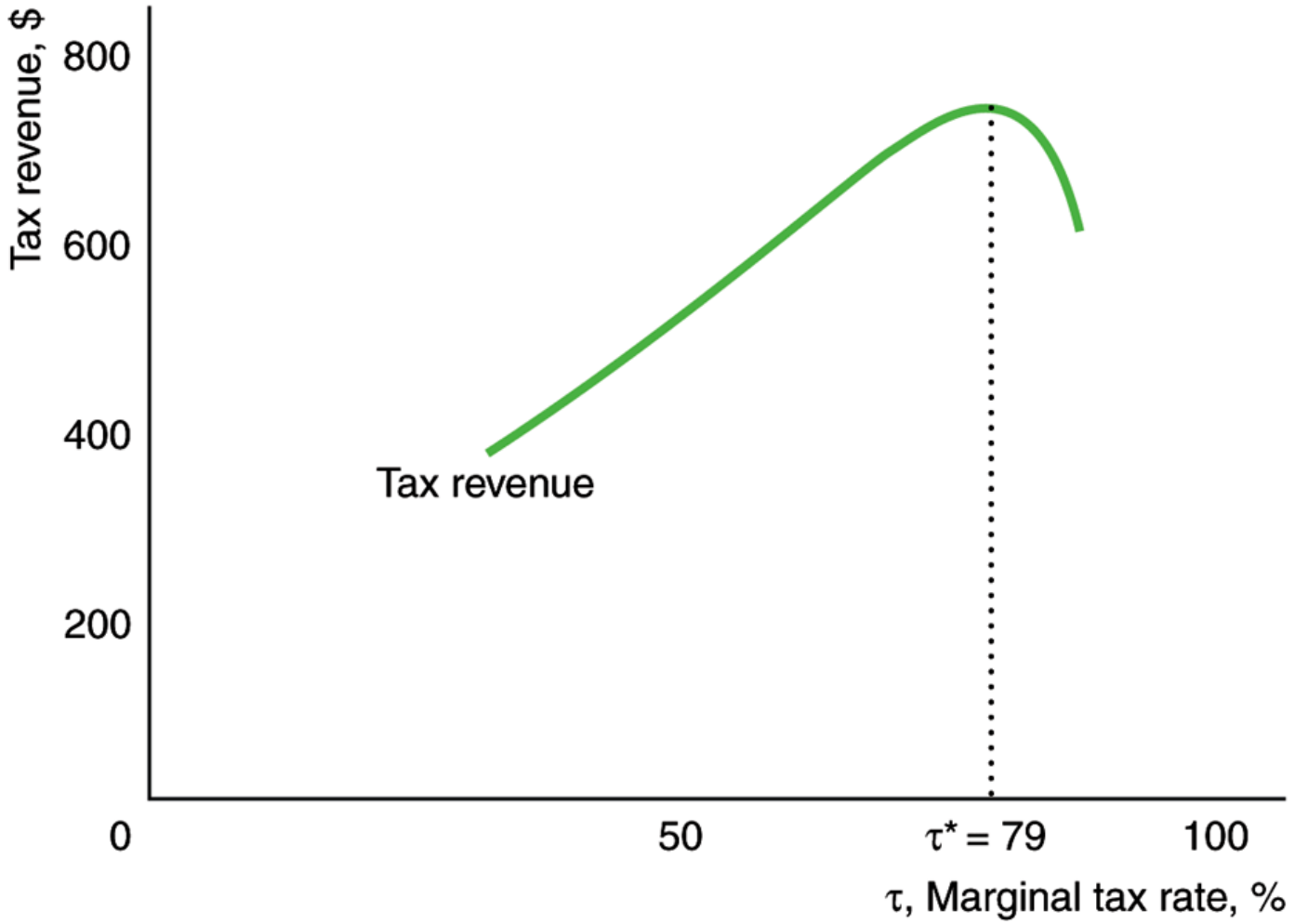


Figure 5.12 Relationship of Tax Revenue to Tax Rates



Cross Chapter Analysis: Child-Care Subsidies