

Demand Theory and Applications: Labor Supply

Economics II: Microeconomics

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October 2009

A Theory of the Decision to Work

The standard model focuses on time-use choices that are market work and leisure called *the neoclassical model of labor-leisure choice*.

Basics:

- Preferences
- Constraints
- Choosing Hours to Work
- Income and Substitution Effects

A Theory of the Decision to Work

- $U=U(Y, N)$
- $H=24 - N$
- Y is consumption goods (\$)
- H is # of hours worked per day,
- N is # of non-working hours or leisure

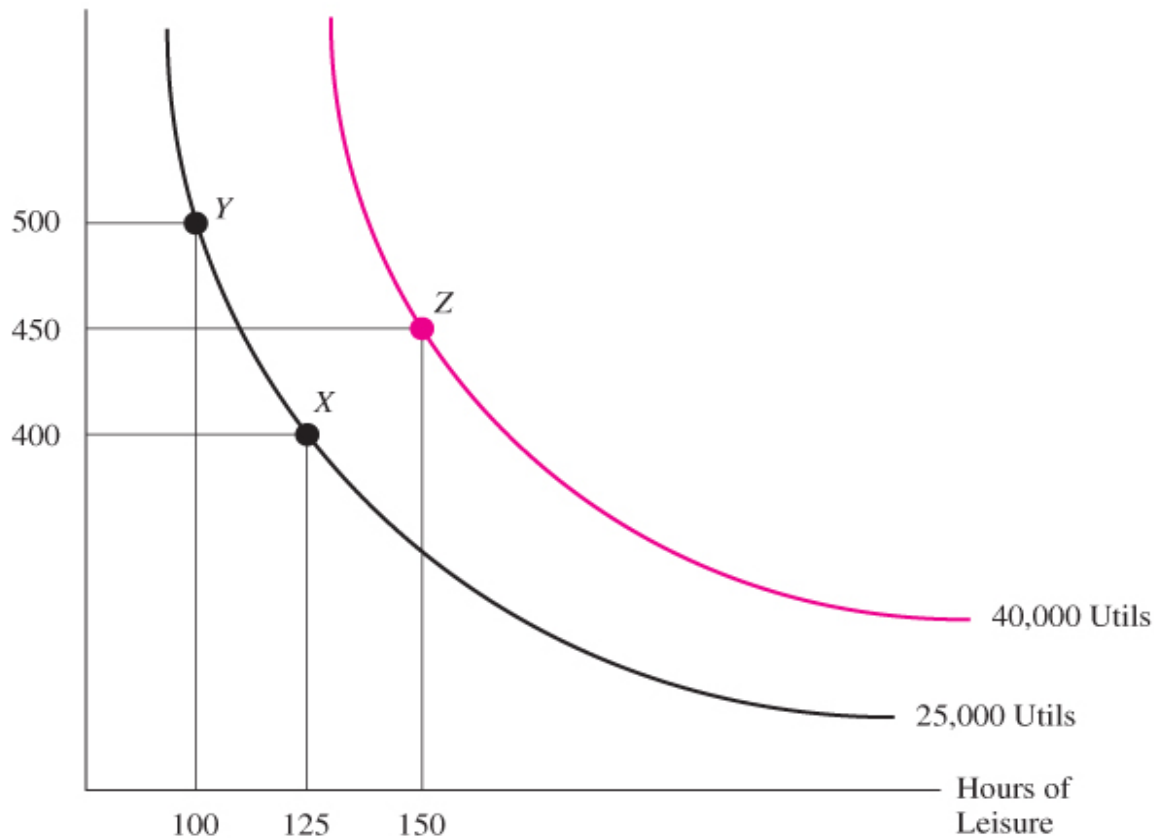
Preferences

Revision

FIGURE 2-2 Indifference Curves

Points X and Y lie on the same indifference curve and yield the same level of utility (25,000 utils); point Z lies on a higher indifference curve and yields more utility.

Consumption (\$)



Preferences

Revision

Properties of indifference curves (ICs):

- ICs are downward sloping;
- Higher ICs indicate higher levels of utility;
- ICs do not intersect;
- ICs are convex to the origin.

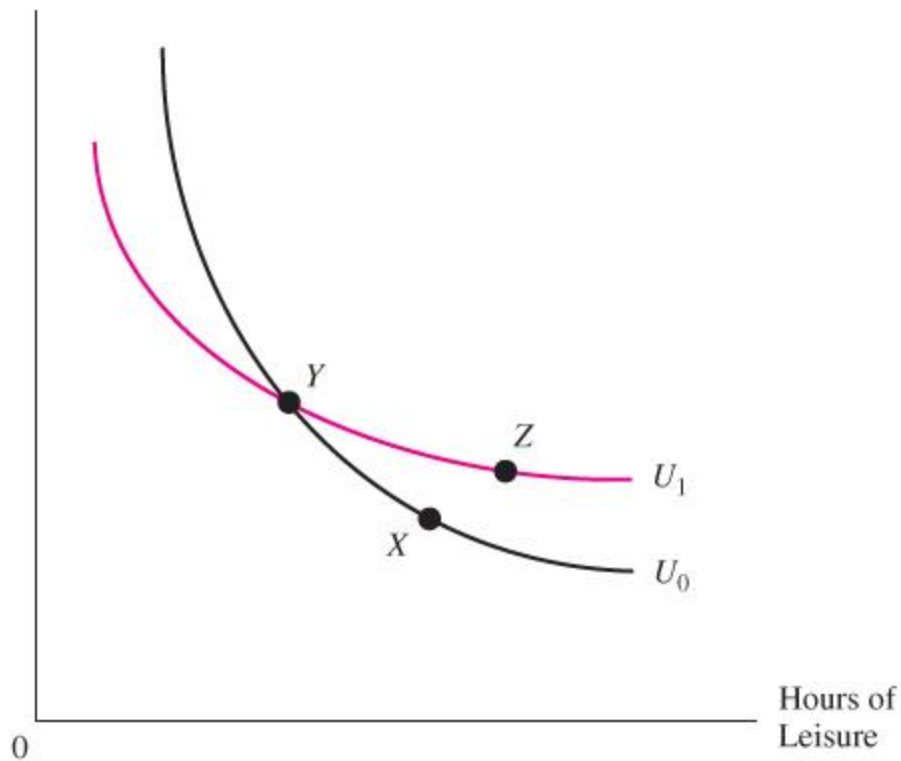
Preferences

Revision

FIGURE 2-3 Indifference Curves Do Not Intersect

Points X and Y yield the same utility because they are on the same indifference curve; points Y and Z also should yield the same utility. Point Z , however, is clearly preferable to point X .

Consumption (\$)

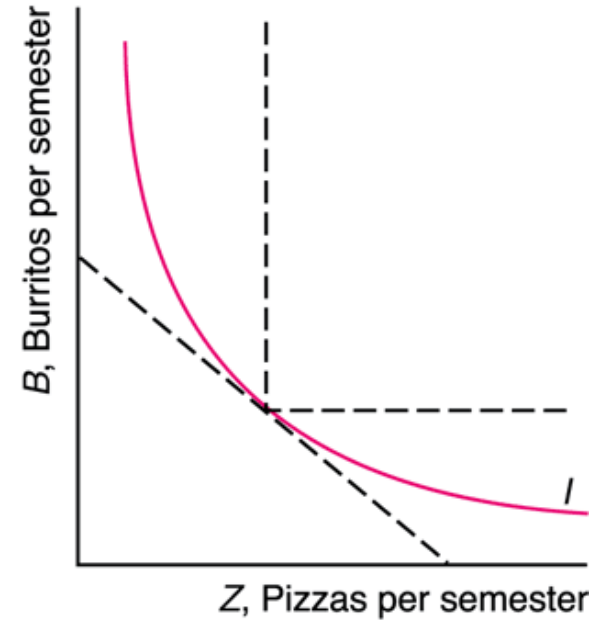
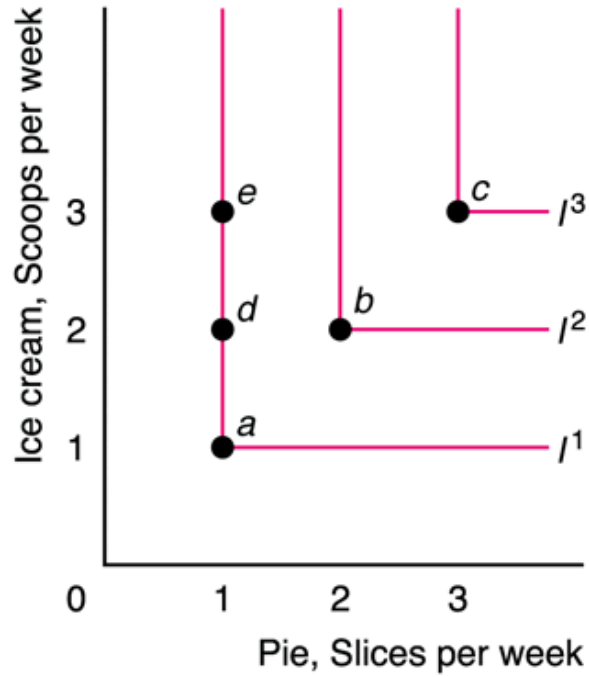
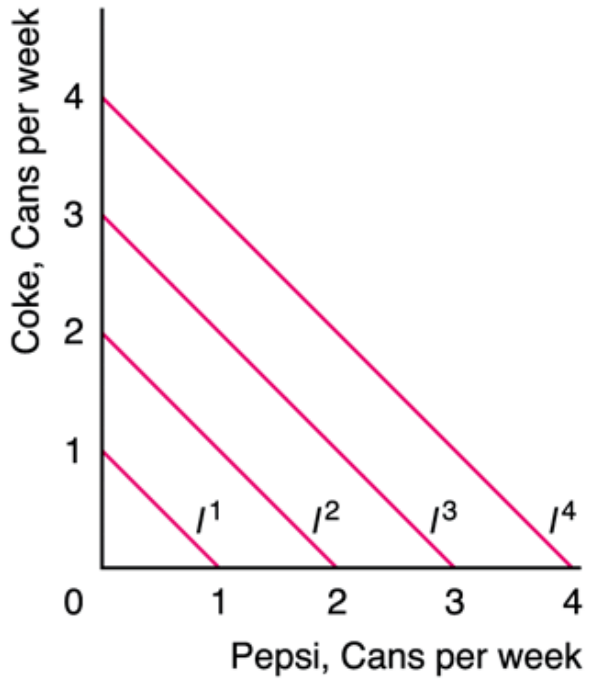


$$U_0: X \sim Y$$

$$U_1: Y \sim Z$$

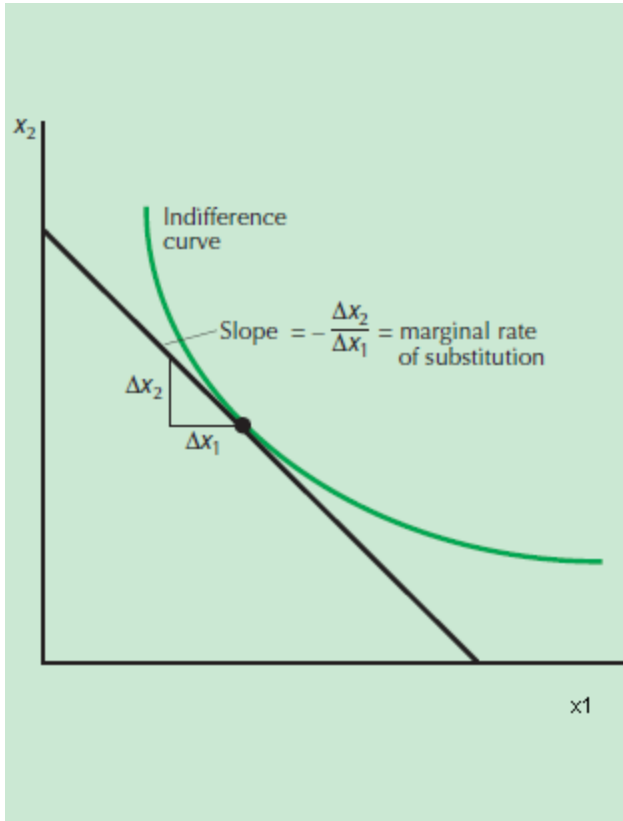
$$??? X \sim Z$$

ICs: Special Cases



Marginal Rate of Substitution

Revision



Definition:

Marginal Rate of Substitution (MRS) is the rate at which the consumer is just willing to substitute one good for the other

- MRS is the (absolute of the) slope of an indifference curve at a particular point:

$$\frac{\Delta x_2}{\Delta x_1} \text{ or } \frac{dx_2}{dx_1}$$

Constraints

- Time constraint: $T = 24 = H + N$
- Budget constraint: $Y = wH + V$

Full-income budget constraint:

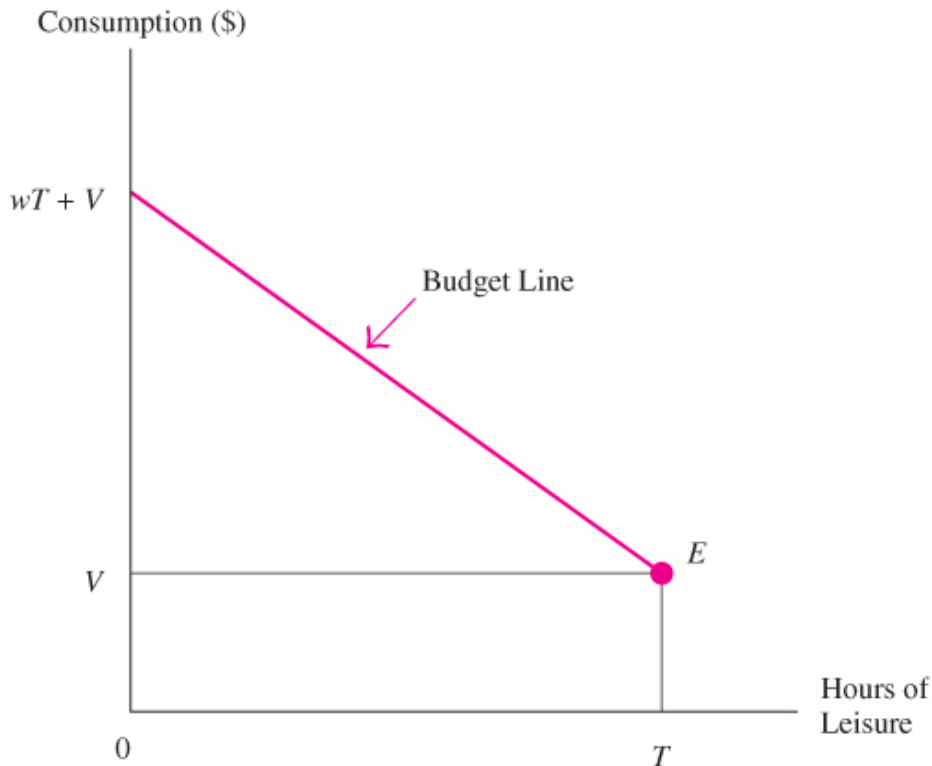
$$Y + wN = wT + V$$

- $wT + V$ maximum person could earn if working $T=24$ hours of the day;
- wN amount of full income spent on leisure
(Note: price of an hour of leisure is the wage rate).

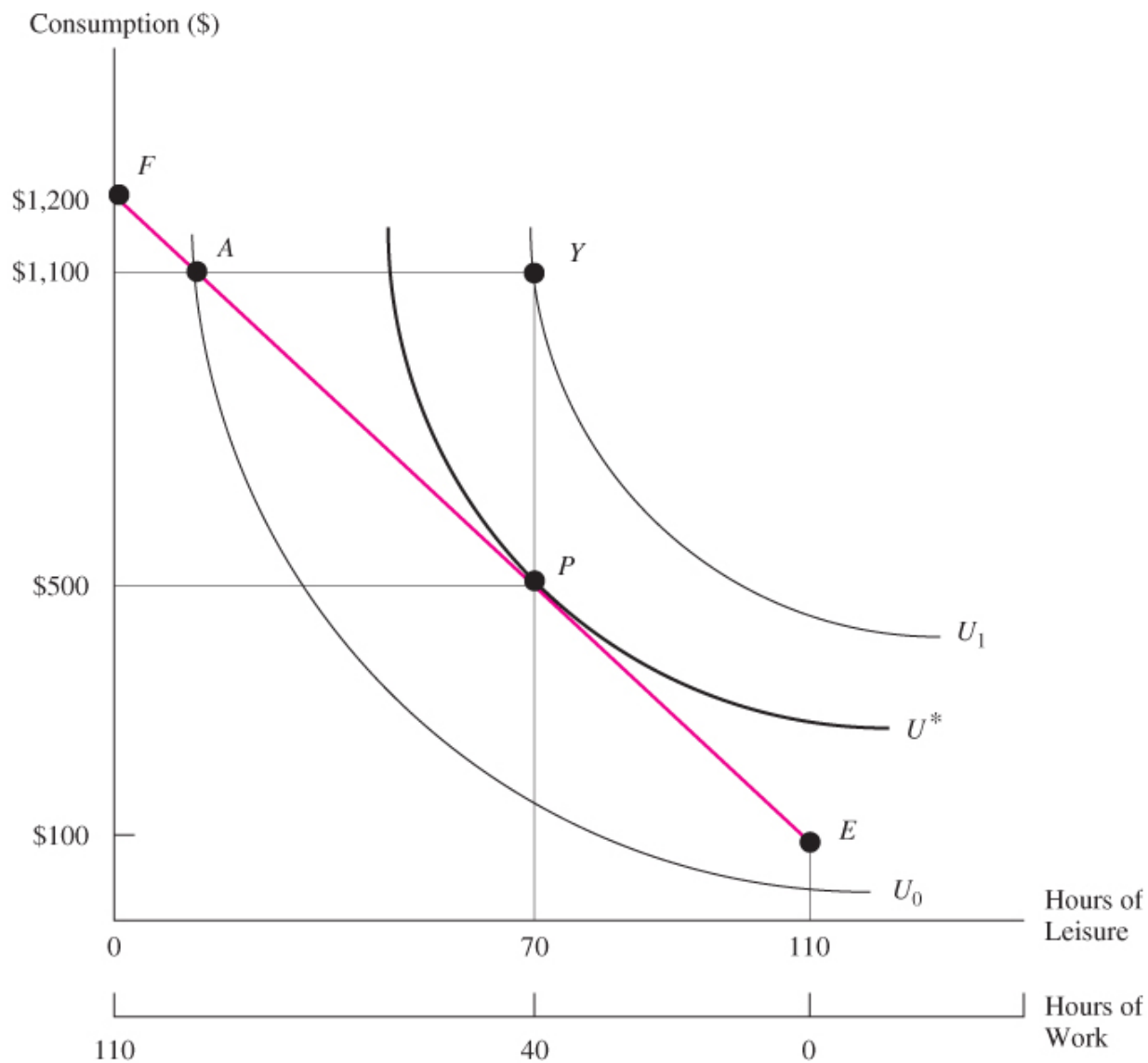
Constraints

FIGURE 2-5 The Budget Line Is the Boundary of the Worker's Opportunity Set

Point E is the endowment point, telling the person how much she can consume if she does not enter the labor market. The worker moves up the budget line as she trades off an hour of leisure for additional consumption. The absolute value of the slope of the budget line is the wage rate.



An Interior Solution to the Labor-Leisure Decision



Choosing Hours to Work

Problem:

$$\max U=U(Y, N)$$

$$\text{s.t. } H = 24 - N,$$

$$Y = wH,$$

Assume $V = 0$, $p_Y=1$.

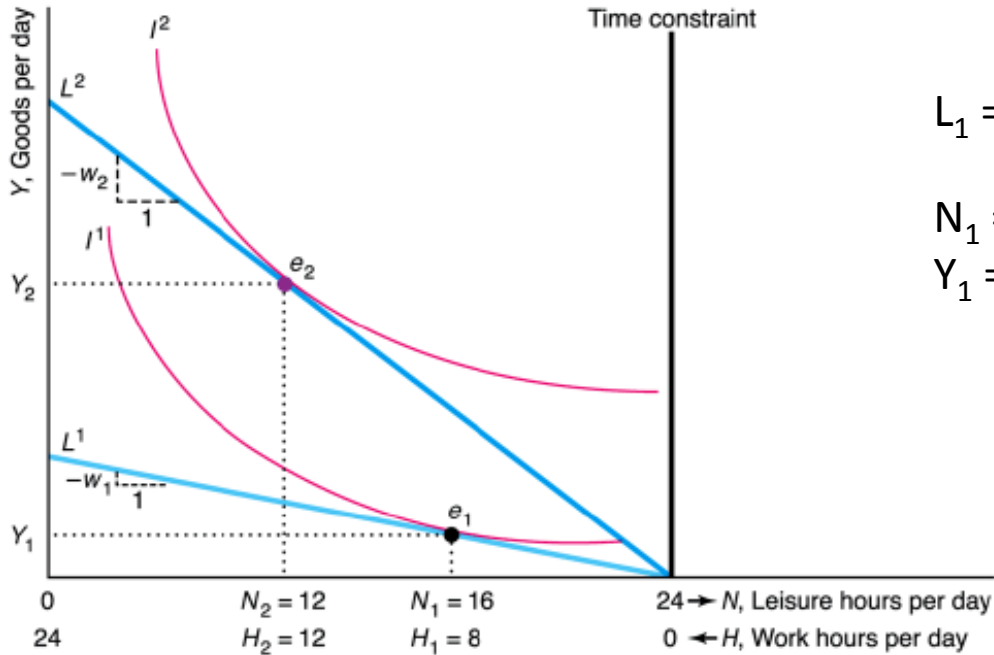
Choosing Hours to Work

Solution:

$$\max_H U = U(wH, 24 - H)$$

$$MRS = \frac{\partial U / \partial Y}{\partial U / \partial N} = -w$$

(a) Indifference Curves and Constraints



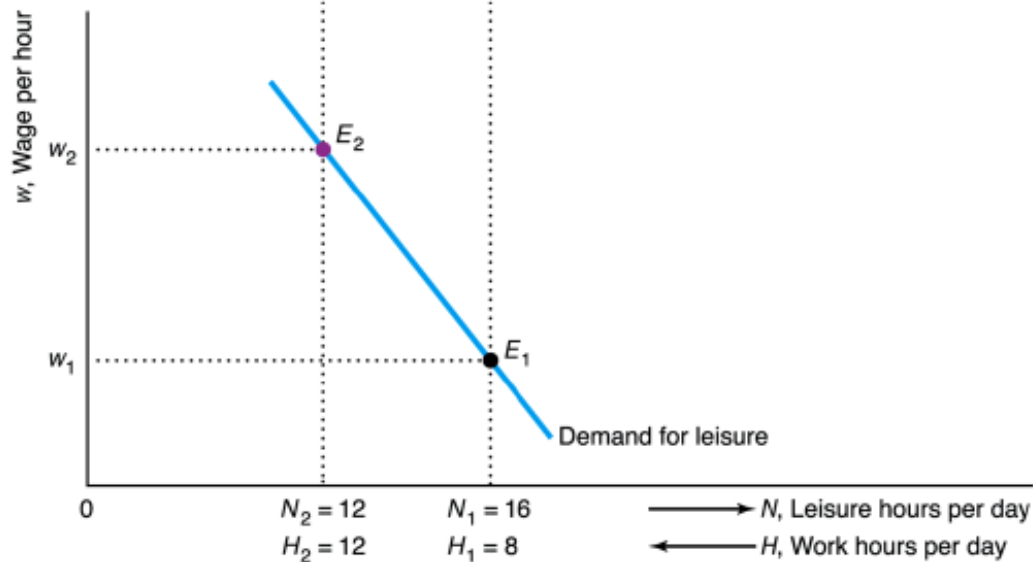
$$L_1 = w_1 H = w_1 (24 - N)$$

$$N_1 = 16 \Rightarrow H_1 = 24 - N_1 = 8$$

$$Y_1 = w_1 H_1 = 8w_1$$

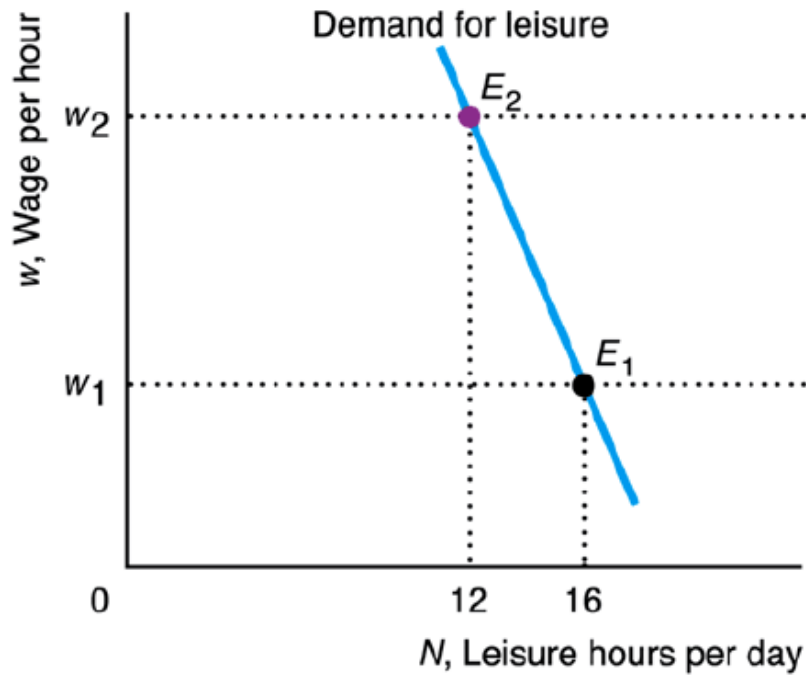
$$w_1 \uparrow = w_2$$

(b) Demand Curve

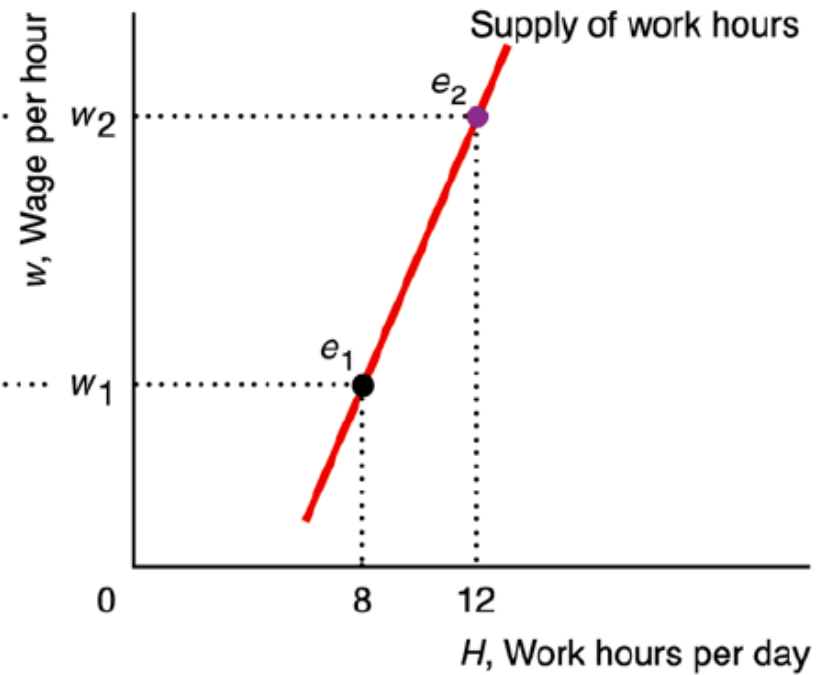


Demand for Leisure

(a) Leisure Demand

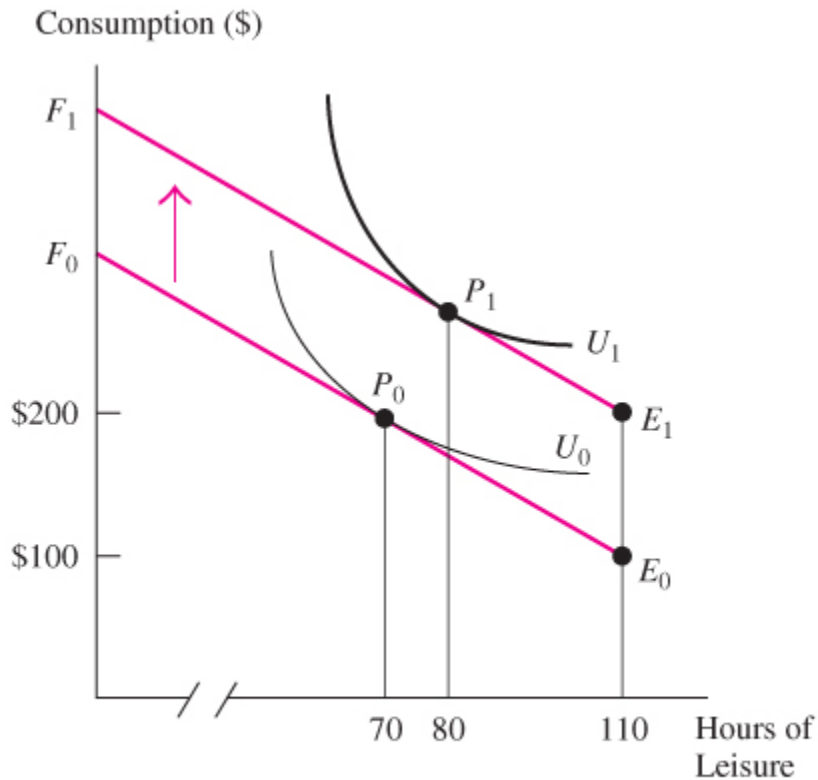


(b) Labor Supply

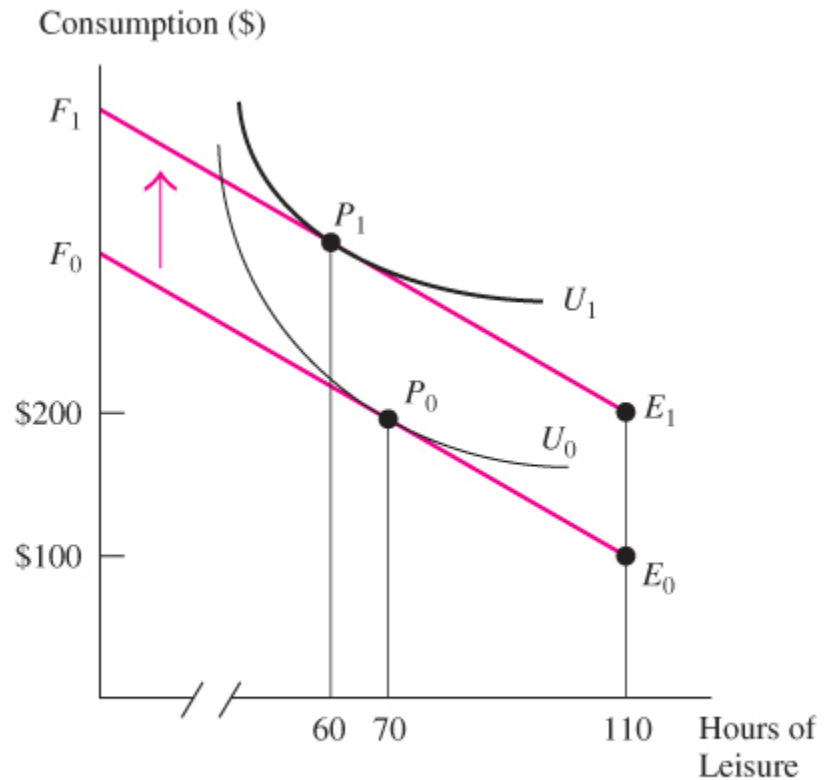


$$N = 24 - H$$

Non-labor income and hours of work



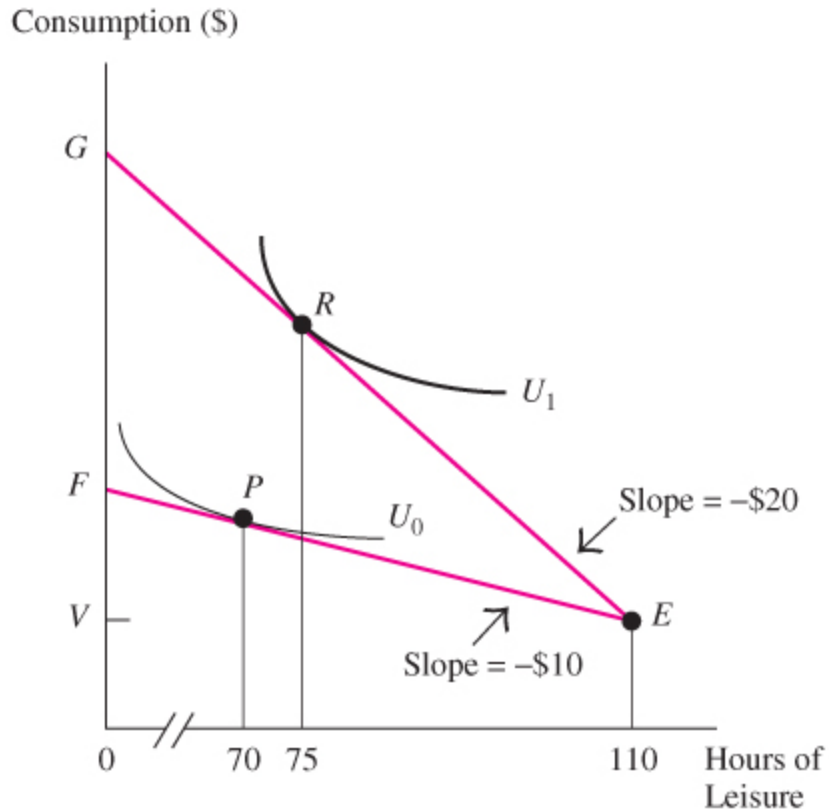
(a) Leisure Is a Normal Good



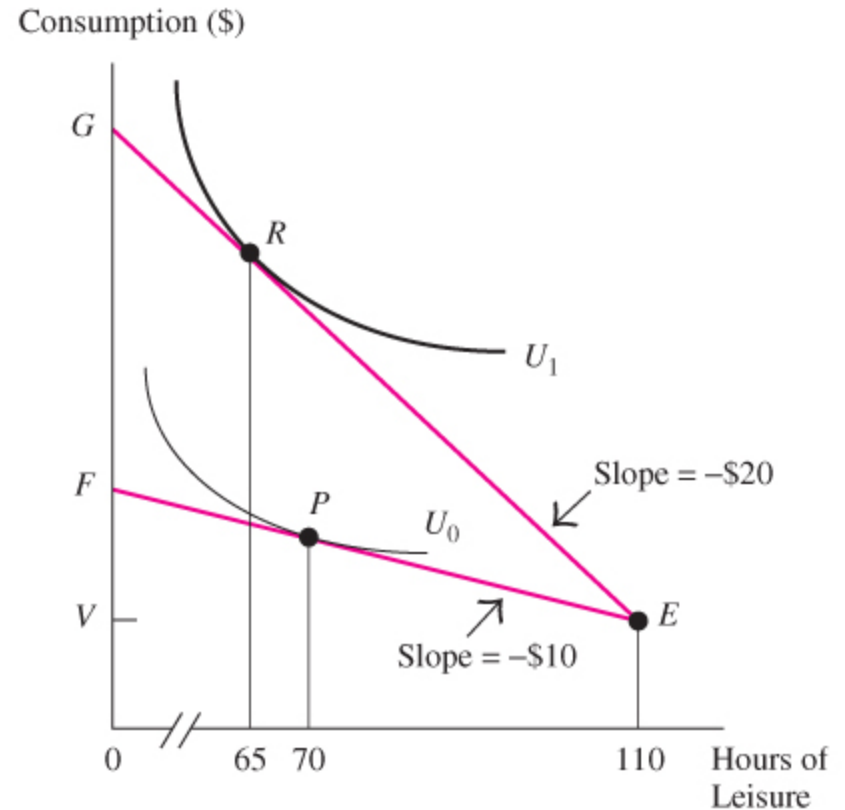
(b) Leisure Is an Inferior Good

The wage rate and hours of work:

Leisure is a normal good

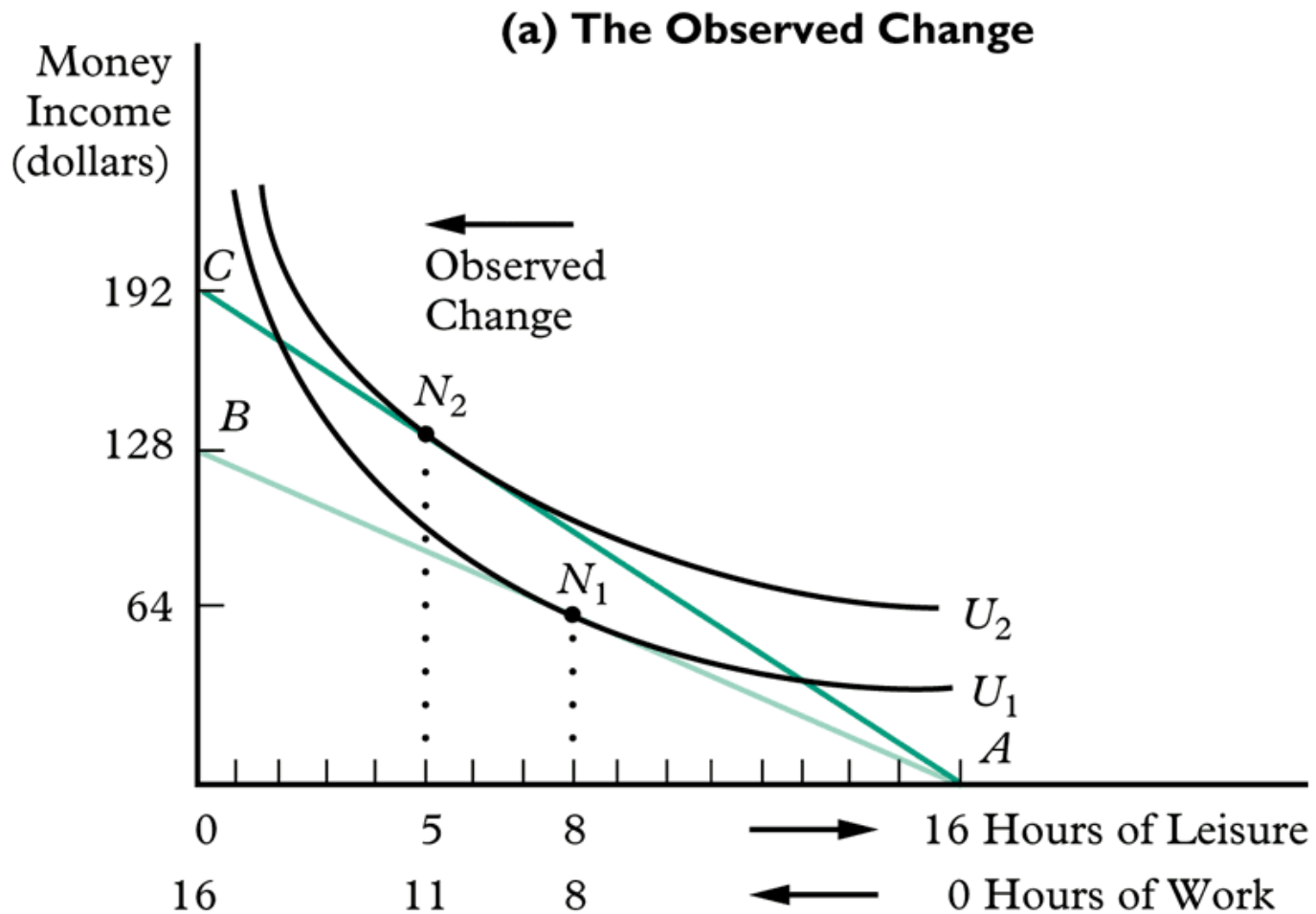


(a)

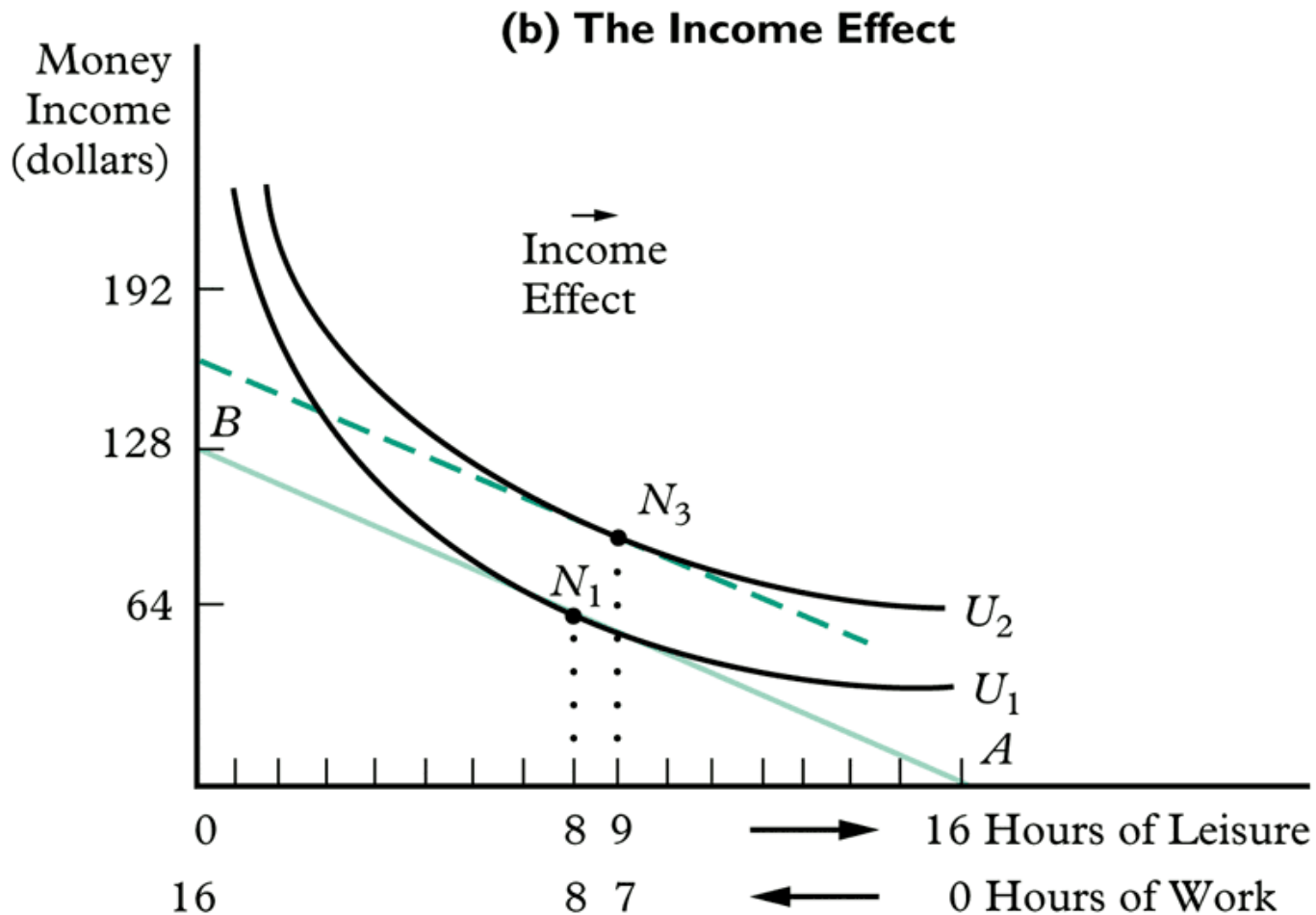


(b)

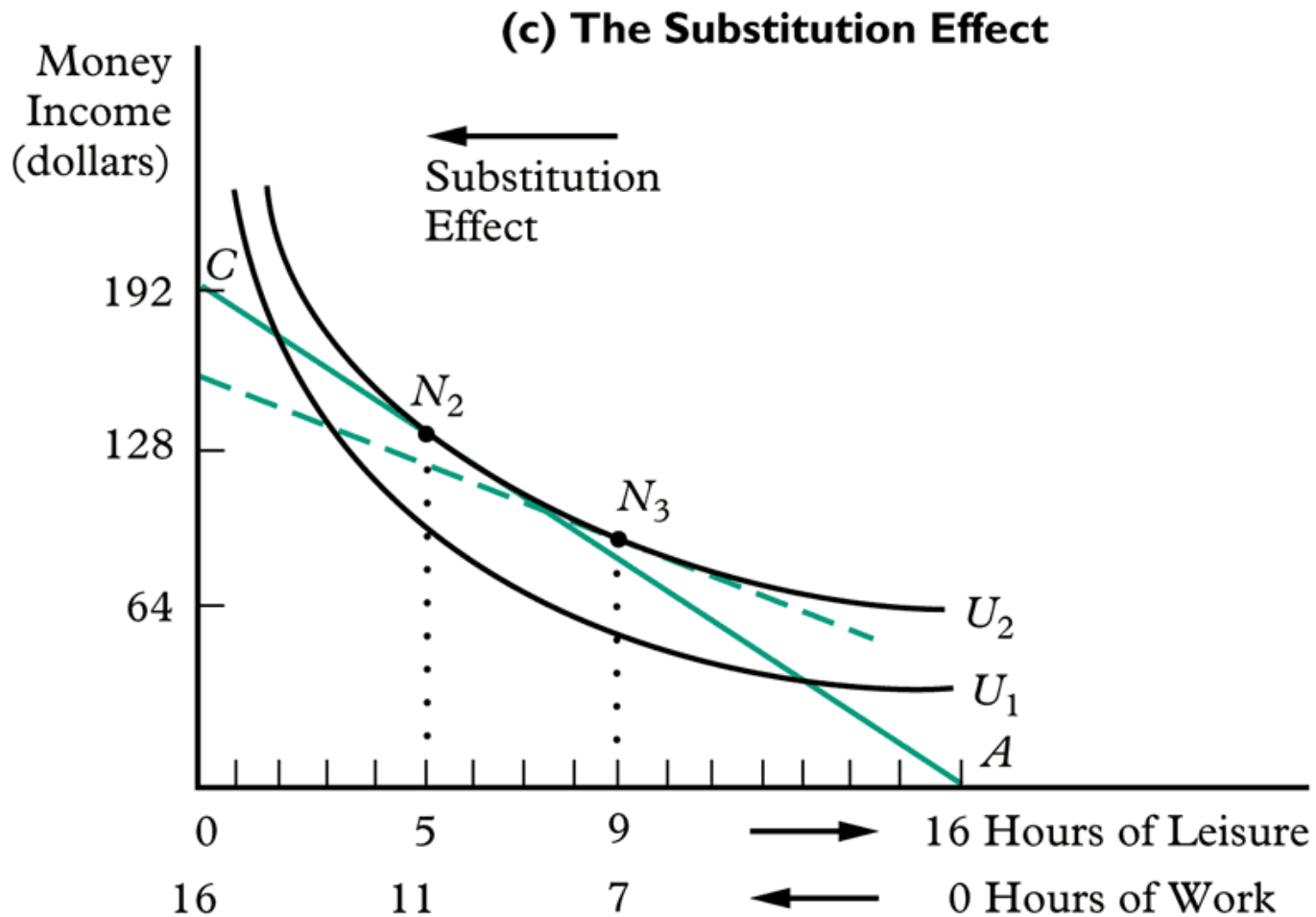
*Wage Increase with Substitution Effect Dominating:
Isolating Income and Substitution Effects*



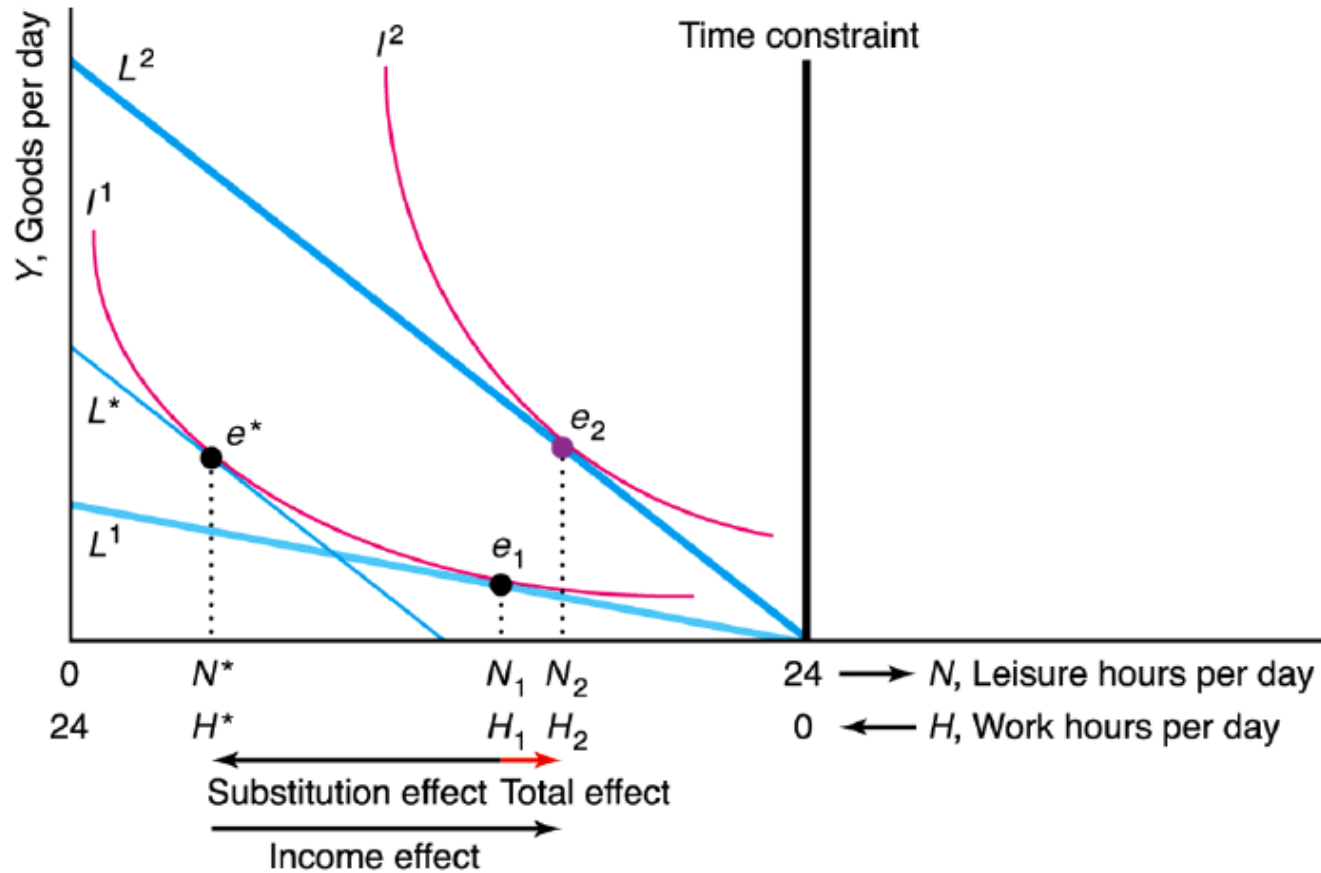
Wage Increase with Substitution Effect Dominating: Isolating Income and Substitution Effects



*Wage Increase with Substitution Effect Dominating:
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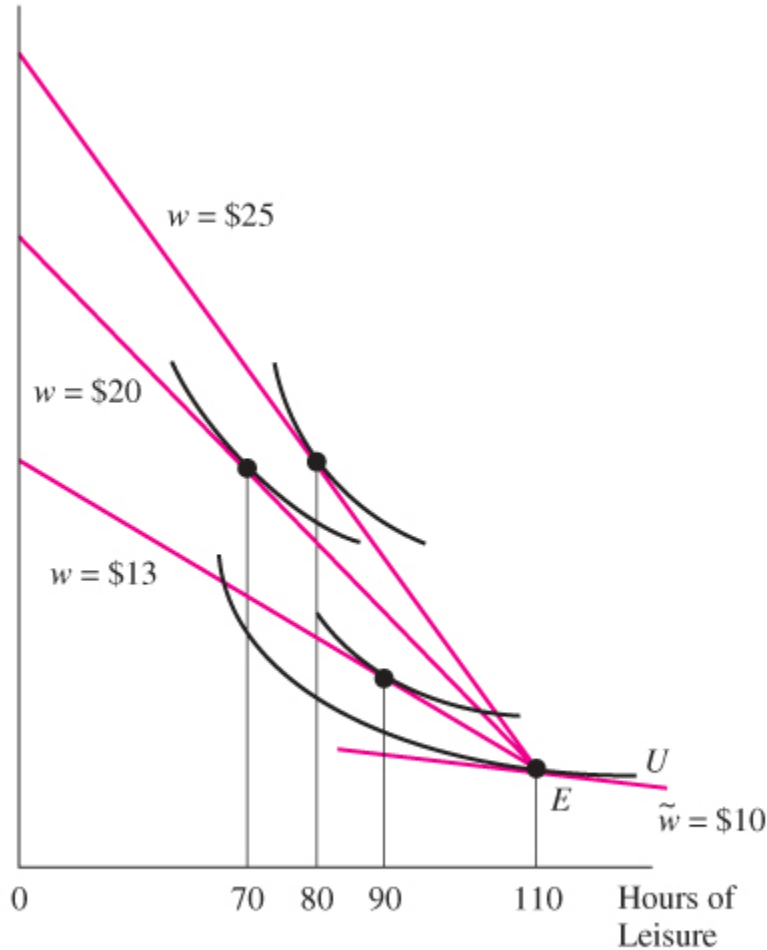


Wage Increase with Income Effect Dominating



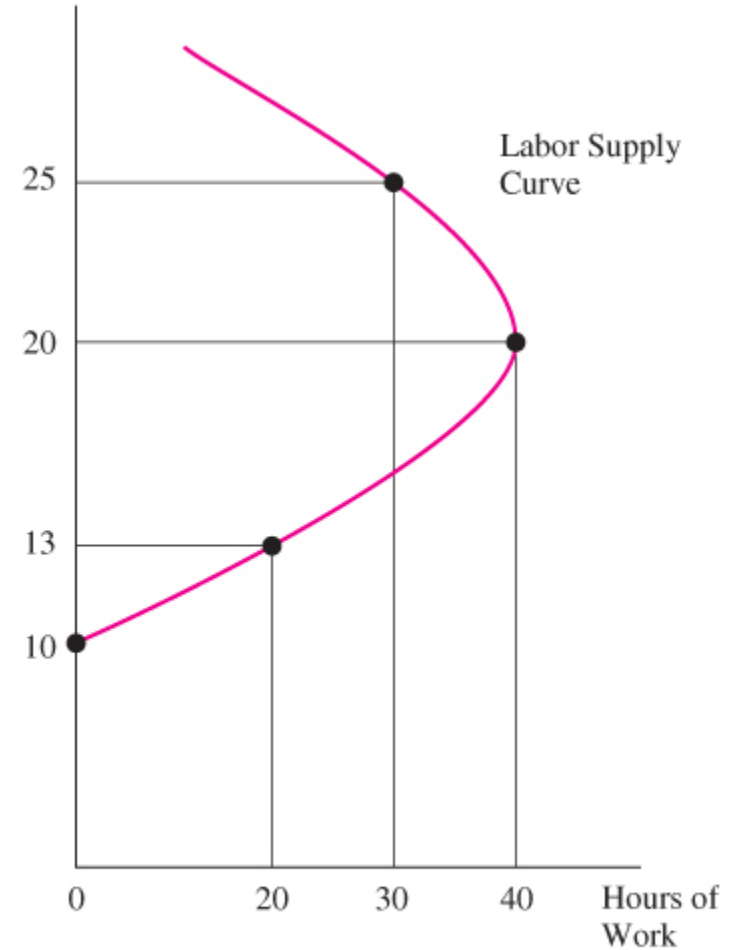
The Labor Supply Curve: Individual

Consumption (\$)



(a) Optimal Consumption Bundles

Wage Rate (\$)



(b) Relation between Optimal Hours of Work and the Wage Rate

The Labor Supply Curve: Market

FIGURE 2-12 Derivation of the Market Labor Supply Curve from the Supply Curves of Individual Workers
The market labor supply curve “adds up” the supply curves of individual workers. When the wage is below \tilde{w}_A , no one works. As the wage rises, Alice enters the labor market. If the wage rises above \tilde{w}_B , Brenda enters the market.

