

ECON 202
INTERMEDIATE MACROECONOMICS
Dr. Yetkiner

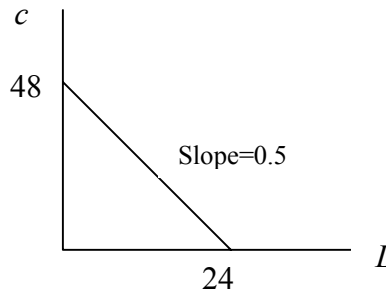
26 February 2007

Key to Exercise 02
The Work-Leisure Tradeoff

1. Rachel derives utility from consuming two goods: leisure time L and coffee, c . Her job affords her flexibility with respect to the amount of hours she works, but the amount of time she has available to split between leisure and working is limited to T hours. Thus the cost of her leisure time is the hourly wage rate. The price of coffee is given by p . She funds her purchase of consumption out of the amount of money she gets from working.

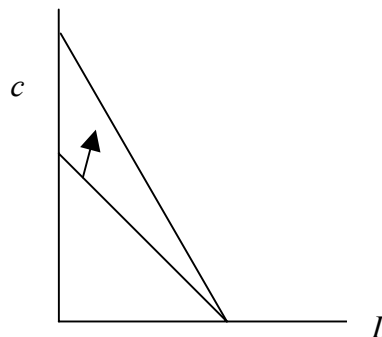
a) Suppose $T=24$, $w=10$, and $p=5$. Write down her budget constraint and represent it graphically (with L on the x-axis and c on the y-axis).

$5c=10(24-L) \rightarrow c=2(24-L)$



b) Show how the budget constraint changes when the wage rate increases to $w=15$. Suppose both consumption goods are normal goods. Sketch Rachel's optimal indifference curves under both budget constraints.

$5c=15(24-L) \rightarrow c=3(24-L)$



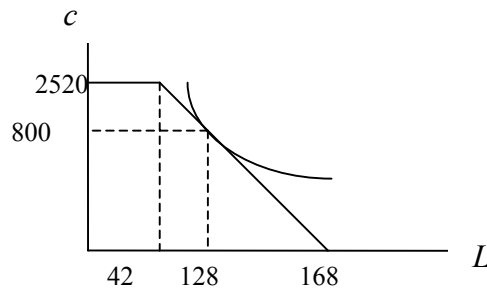
c) Disentangle graphically the response of consumption of coffee into income and substitution effects. Is the substitution effect positive or negative? What about the income effect? How does this compare to the usual situation where we are looking at the effect of, for instance, a price increase of oranges on other consumption goods?

Substitution effect: $w \uparrow c \uparrow$

Income effect: $w \uparrow c \uparrow$

2. Assume that there are 168 hours in a week, so the number of leisure hours equals 168 minus the number of hours worked.

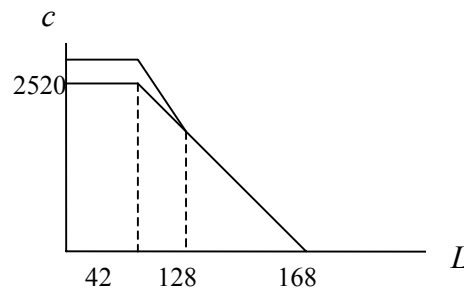
a) Suppose that a consumer, Colin, can work as many hours as he wishes during the week for a wage of \$20/hour, but that he needs to sleep at least 42 hours per week (which counts as leisure). Show the graph of his budget constraint.



b) Suppose now that Colin chooses to work 40 hours per week. Show Colin's indifference map and her utility-maximizing equilibrium.

See a.

c) Suppose that overtime work (all hours above 40 per week) earns a doubled wage (\$40/hour). Show how the budget constraint changes. Can you be sure that Colin will work overtime?



Yes.

3. An individual is endowed with $h=24$ hours and $\pi = 120$ units of fixed income (dollars) per day. His marginal rate of substitution in resource supply is $MRS_{lc} = c/l$. The wage facing him is $w = 10$. How many hours of labor will he supply, and what will be his income from labor?

From $\frac{MU_l}{MU_c} = MRS_{lc} = \frac{p_l}{p_c} \Rightarrow c = 10l$ Using this in the budget constraint,
 $c = w(24 - l) + \pi$ gives $l^* = 18$ and $c^* = 180$.

4. Answer the following questions.

a) Why can a worker's budget constraint for leisure and all other goods only pivot around one end?

Because $h=24$ is constant.

b) How does a decrease in wages affect workers' decisions between leisure and labor?

Substitution effect: $w \downarrow \rightarrow \text{leisure} \uparrow \rightarrow c \downarrow$
Income effect: $w \downarrow \rightarrow \text{leisure} \downarrow \rightarrow c \downarrow$
Total ? \downarrow

c) What set of circumstances would generate a backward-bending labor supply curve?

Whenever income effect dominates substitution effect!

d) What happens to labor supply if the wage increases, and the labor supply curve is backward-bending?

Substitution effect: $w \uparrow \rightarrow \text{leisure} \downarrow \rightarrow c \uparrow$
Income effect: $w \uparrow \rightarrow \text{leisure} \uparrow \rightarrow c \uparrow$
Total $\uparrow \uparrow$