

METU, Department of Economics

ECON 201 – Problem Set 6

- 1- The prices are $(p_1, p_2) = (2, 3)$, and the consumer is currently consuming $(x_1, x_2) = (4, 4)$. There is a perfect market for the two goods in which they can be bought and sold costlessly. Will the consumer necessarily prefer consuming the bundle $(y_1, y_2) = (3, 5)$? Will she necessarily prefer having the bundle (y_1, y_2) ?

Solution:

The two bundles are

Current consumption: $x = (4, 4)$

Alternative bundle: $y = (3, 5)$

Without knowing her utility function, we cannot say which bundle she likes more as a consumption bundle. For example:

If $u(x_1, x_2) = x_1$ (she only cares about good 1), then

$u(4, 4) = 4 > 3 = u(3, 5)$, so she prefers $(4, 4)$.

If $u(x_1, x_2) = x_2$ (only cares about good 2), she prefers $(3, 5)$.

So she does not necessarily prefer consuming $(3, 5)$.

The value of the current bundle $(4, 4)$ at prices $(2, 3)$ is

$$p \cdot x = 2 \cdot 4 + 3 \cdot 4 = 8 + 12 = 20,$$

while the value of $(3, 5)$ is

$$p \cdot y = 2 \cdot 3 + 3 \cdot 5 = 6 + 15 = 21.$$

If she has $(3, 5)$ as her endowment, she can freely trade at those prices. Since $21 > 20$, the budget set generated by $(3, 5)$ strictly contains the budget set generated by $(4, 4)$. With more wealth she can always achieve at least the same utility as before.

Conclusion:

The bundle $(y_1, y_2) = (3, 5)$ costs more than the bundle $(x_1, x_2) = (4, 4)$ at the current prices. The consumer will not necessarily prefer consuming this bundle, but would certainly prefer to own it, since she could sell it and purchase a bundle that she would prefer.

- 2- The prices are $(p_1, p_2) = (2, 3)$, and the consumer is currently consuming $(x_1, x_2) = (4, 4)$. Now the prices change to $(q_1, q_2) = (2, 4)$. Could the consumer be better off under these new prices?

Solution:

It depends on whether she was a net buyer or a net seller of the good that became more expensive.

Net buyer $\Rightarrow$ worse off

Net seller $\Rightarrow$ better off

- 3- Suppose that by some miracle the number of hours in the day increased from 24 to 30 hours (with luck this would happen shortly before exam week). How would this affect the budget constraint?

Solution:

Let $w + l \leq 24$

Where w is the hours worked and l is leisure time.

When hours in the day become 30, the equation becomes,

$$w + l \leq 30$$

You now have a larger feasible set of work/leisure bundles, since you can allocate up to 30 hours instead of 24.

The new budget line would shift outward and remain parallel to the old one, since the increase in the number of hours in the day is a pure endowment effect.

- 4- Explain how the individual labor supply curve can become backward-bending at high wage levels. Use the decomposition into income and substitution effects of a wage increase on leisure to show:
- Why the labor supply curve may initially slope upward, and
 - Under what conditions it bends backward (i.e., higher wages lead to fewer hours worked).
- Illustrate your answer with an indifference-curve/budget-constraint diagram.

Solution:

When the wage rate w rises, the price of leisure increases (its opportunity cost in terms of forgone consumption rises). Two effects operate:

1. Substitution effect (SE):

Higher w makes leisure relatively more expensive than consumption. The individual substitutes away from leisure toward work, which leads to more hours worked.

2. Income effect (IE):

For a given number of hours worked, a higher wage raises income. If leisure is a normal good, higher income makes the person want more leisure, which leads to fewer hours worked.

At low and medium wage levels, the substitution effect usually dominates the income effect, so a wage increase leads to more hours worked. The individual labor supply curve therefore slopes upward in this range.

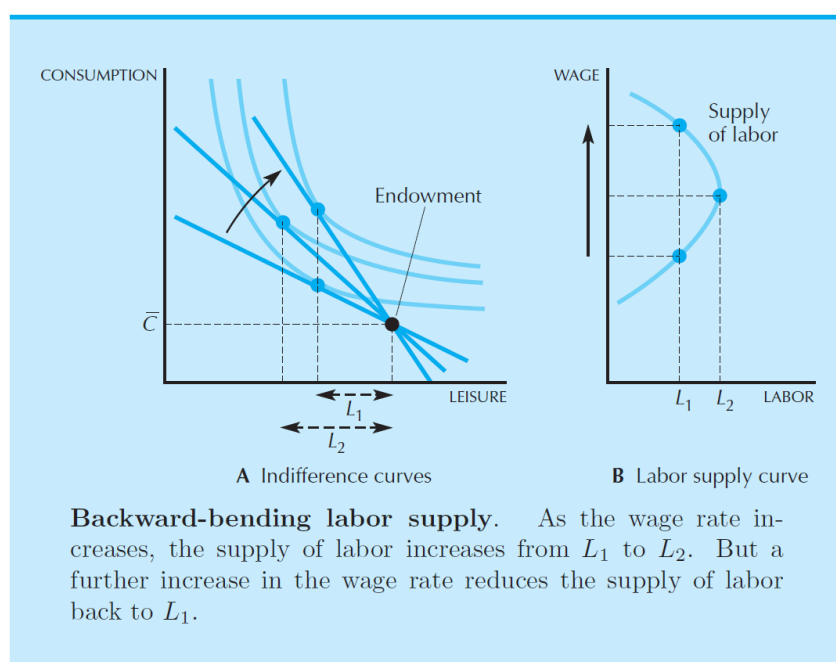
At high wage levels, the income effect can become stronger than the substitution effect. The person is already earning a high income and prefers to “buy” more leisure rather than keep increasing consumption. When $IE > SE$, a further increase in the wage causes hours worked to fall.

Graphically, in a leisure–consumption diagram:

- A wage increase pivots the budget line around the full-time-leisure point, making it steeper.
- The new tangency with a higher indifference curve may involve more leisure

and less work when the income effect dominates.

Plotting hours worked against the wage then yields an individual labor supply curve that first slopes upward and then bends backward at higher wages.



- 5- If leisure is an inferior good, what can you say about the slope of the labor supply curve?

Solution:

If leisure is an inferior good, then when income rises you want less leisure, i.e. you want to work more.

$$\frac{\partial l}{\partial M} < 0$$

So when the wage increases:

Substitution effect: work more (leisure becomes more expensive).

Income effect (with inferior leisure): also work more (because higher income makes you reduce leisure).

The two effects go in the same direction, so the labor supply curve is upward-sloping everywhere (no backward-bending part).

- 6- Consider a worker who has chosen to supply a certain amount of labor $L^* = R - R^*$ when faced with the wage rate w . Now suppose that the firm offers him a higher wage, $w' > w$, for extra time that he chooses to work. Such a payment is known as an overtime wage. What can you say about the change in the labor supplied for this individual worker?

Solution:

A higher overtime wage means that the slope of the budget line will be steeper for labor supplied in excess of L^* . But then we know that the worker will optimally choose to supply more labor, by the usual sort of

revealed preference argument: the choices involving working less than L^* were available before the overtime was offered and were rejected.

Note that we get an unambiguous increase in labor supply with an overtime wage, whereas just offering a higher wage for all hours worked has an ambiguous effect—as discussed above, labor supply may increase or it may decrease. The reason is that the response to an overtime wage is essentially a pure substitution effect—the change in the optimal choice resulting from pivoting the budget line around the chosen point. Overtime gives a higher payment for the extra hours worked, whereas a straight increase in the wage gives a higher payment for all hours worked. Thus a straight-wage increase involves both a substitution and an income effect while an overtime-wage increase results in a pure substitution effect.

