

# Chapter 6

## Supply of Labor to the Economy: The Decision to Work

Beyond introducing some descriptive material on labor force trends in this century, the primary purpose of Chapter 6 is to present an analysis of an individual's decision concerning whether and for how long to work. The context of this decision is the traditional labor/leisure choice framework and the chapter is carefully constructed to build the concepts necessary for this analysis. The analysis begins with a section that discusses the choice process verbally, building upon what students know concerning product demand. It then moves to a specific analysis of the demand for leisure time (which in this context is the obverse of the supply of labor), and introduces the concepts of income and substitution effects (they are more rigorously dealt with later, in the context of a graphic analysis).

Our graphic analysis is intended to accomplish two ends. One is to fix and define more precisely the concepts of income and substitution effects. The second is to equip students with a tool necessary to analyze many policy issues affecting work incentives. A sampling of such policies and their analyses is given in the final section of the chapter (following a section that discusses empirical findings concerning labor supply to the economy).

### ■ List of Major Concepts

1. Measures of aggregate labor supply generally focus on labor force participation rates and weekly hours of work; trends in these measures are presented and discussed.
2. The relationship between the demand for leisure, the demand for other goods, and the supply of labor is the focal point for beginning our analysis of labor supply theory.
3. The substitution effect is defined as the change in hours supplied attendant on a change in the wage (price of leisure), holding income constant.
4. The income effect is the change in hours supplied for a given change in income, holding the wage constant.
5. The major forces affecting labor supply are preferences, wages, and income; these forces can be graphically depicted.
6. The five assumptions underlying indifference curves (a graphic depiction of preferences) are discussed.
7. The incorporation of information on wages and income into the drawing of budget constraints is illustrated.
8. Graphical analyses of the income and substitution effects are presented.
9. The concept of "reservation wage" is defined and illustrated graphically.

10. Empirical findings with respect to the labor/leisure choice, from both nonexperimental cross-section data and experimental studies, are presented.
11. Analyses of the budget constraints created by several government income support programs are presented. Analyzed are those with “skikes,” those with zero net wage rates (including those with work requirements), and those with positive effective wage rates (as illustrated by an analysis of the Earned Income Tax Credit program).

## ■ Answers to Even-Numbered Review Questions

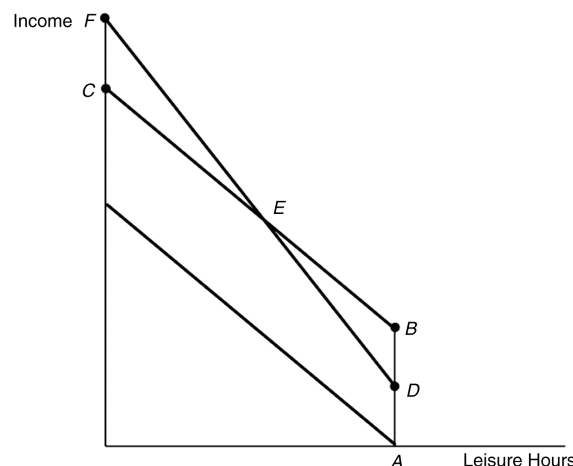
2. Evaluate the following quote: “Higher take-home wages for any group should increase the labor force participation rate for that group.”

**Answer:** This quotation is correct, because for labor force *participation* decisions, the substitution effect dominates the income effect. The strength of the income effect is relatively weaker when the initial hours of work are smaller. When initial hours of work are zero—as is the case when a person is out of the labor force—then the income effect is zero if leisure is a normal good (increased resources cannot induce one to increase the consumption of leisure, since leisure hours are already at their maximum).

4. The way the workers’ compensation system works now, employees permanently injured on the job receive a payment of  $\$X$  each year whether they work or not. Suppose the government were to implement a new program in which those who did not work at all got  $\$0.5X$  but those who did work got  $\$0.5X$  plus workers’ compensation of 50 cents for *every hour worked* (of course, this subsidy would be in addition to the wages paid by their employers). What would be the change in work incentives associated with this change in the way workers’ compensation payments are calculated?

**Answer:** This change in workers’ compensation has two effects. First, it reduces the subsidy for people who do not work from  $\$X$  to  $\$0.5X$ . This reduction in income by itself would produce an income effect that tends to induce the injured worker to work more (he or she is poorer if not working than under the previous workers’ compensation system). On the other hand, for those who work, the wage rate is increased by 50 cents an hour. (We assume here that the change in workers’ compensation payments is not so large as to influence market wages.) The increased wage *by itself* would tend to induce injured workers to work more because the cost of leisure has risen by 50 cents an hour; however, the eventual outcome is theoretically unclear.

The effects of these changes can be seen in the figure below.

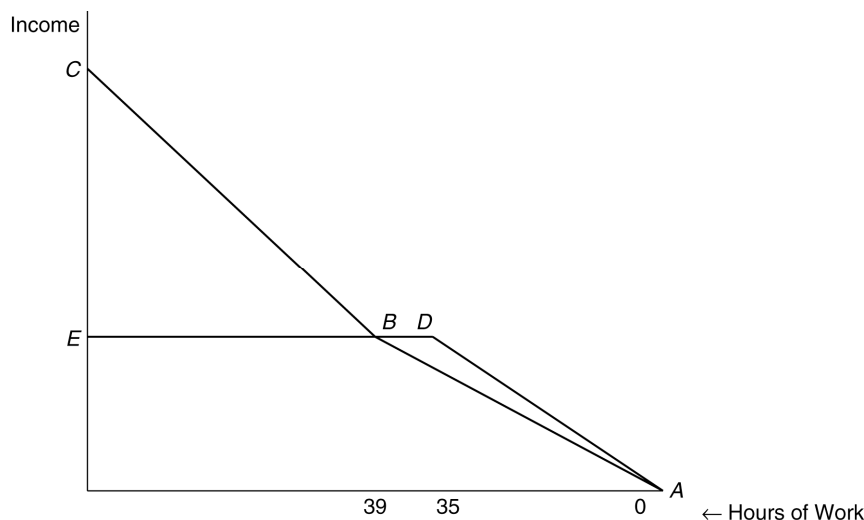


Along segment  $DE$  there is a clear-cut strengthening of work incentives. Segment  $DE$  has a steeper slope than the previous budget constraint ( $BQ$ ) and it also lies to the southwest of  $BC$ . Thus, along segment  $DE$  there is a substitution effect inducing more work and an income effect that also induces more work. To the left of Point  $E$ , however, along segment  $EF$ , there are income and substitution effects that work in opposite directions. Along segment  $EF$  the 50-cents-an-hour increase in the wage rate is sufficient to increase the injured worker's income under workers' compensation, thereby creating an income effect that reduces work incentives, other things equal. However, the substitution effect of the increased wage continues to exert an increase in work incentives, and the outcome of the two effects is not predictable in advance.

Thus, if the tangency point between the worker's indifference curve and the full budget constraint used to be along  $BC$  but to the right of Point  $E$ , the worker faces a clear-cut strengthening of work incentives under the new program. If, however, the worker's tangency point along  $BC$  was to the left of Point  $E$ , the new program would have an unpredictable effect on work incentives.

6. In 2002, a French law went into effect that cut the standard work week from 39 to 35 hours (workers got paid for 39 hours even though working 35), while at the same time prohibiting overtime hours from being worked. (Overtime in France is paid at 25% above the normal wage rate.) (a) Draw the old budget constraint, showing the overtime premium after 39 hours of work. (b) Draw the new budget constraint. (c) Analyze which workers in France are better off under the 2002 law. Are any worse off? Explain.

**Answer:** In the drawing below, the old (pre-2002) constraint is  $ABC$ , where slope of  $BC$  is 25% greater (in absolute value) than the slope of  $AB$ . The constraint created by the new law is  $ADE$ , where earnings at  $D$  are equal to those at  $B$ , and the slope of  $DE$  is horizontal (workers cannot get paid for more than 35 hours of work).



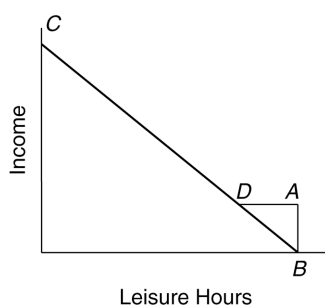
Workers who used to work 39 hours per week are clearly better off under the new law. Those who worked more than 39, but whose tangency point was close to  $B$ , will also be better off *if their original utility-maximizing indifference curve passed below Point  $D$* . However, for those whose original utility-maximizing indifference curves passed above Point  $D$  (almost surely the case for most of those with original tangencies along  $BC$ ), utility will fall under the new law.

8. The Tax Reform Act of 1986 was designed to reduce the marginal tax rate (the tax rate on the last dollars earned) while eliminating enough deductions and loopholes so that total revenues collected by the government could remain constant. Analyze the work incentive effects of tax reforms that lower marginal tax rates while keeping total tax revenues constant.

**Answer:** Reducing the marginal tax rate has the effect of increasing the wage rate, because workers are allowed to keep more from any extra hours worked. Keeping tax revenues constant suggests that workers' after-tax incomes also remain constant. Thus, the Tax Reform Act tended to increase the wage while keeping workers' incomes constant—creating a pure substitution effect that tended to increase hours of work.

10. Assume that the current Disability Insurance (DI) benefit for those who are unable to work is \$ $X$  per day, and that DI benefits go to *zero* if a worker accepts a job for even one hour per week. Suppose that the benefit rules are changed so those disabled workers who take jobs that pay less than \$ $X$  per day receive a benefit that brings *their total daily income* (earnings plus the DI benefit) up to \$ $X$ . As soon as their labor market earnings rise above \$ $X$  per day, their disability benefits end. Draw the old and new budget constraints (label each clearly) associated with the DI program, and analyze the work incentive effects of the change in benefits.

**Answer:** The old constraint is  $ABC$  in the below diagram; the new one is  $BADC$ .



There is no change in the incentives to work (as long as indifference curves slope down).

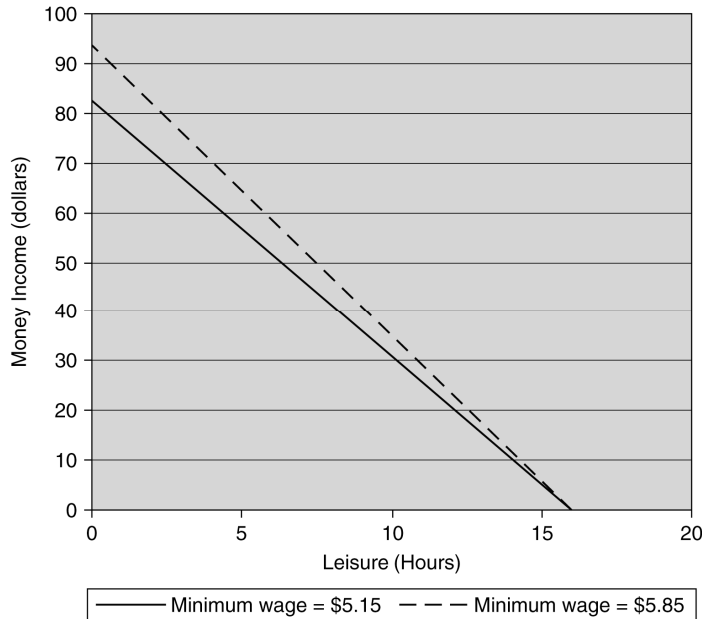
## ■ Answers to Even-Numbered Problems

2. Nina is able to select her weekly work hours. When a new bridge opens up, it cuts one hour off Nina's commute to work. If both leisure and income are normal goods, what is the effect of the shorter commute on Nina's work time?

**Answer:** When the new bridge opened, Nina's budget constraint shifted to the right in a parallel fashion as the amount of available time for either work or leisure (as opposed to commuting) was increased. This shift in her constraint created an income effect (she can now work more *and* consume more leisure). Because both income and leisure are normal goods, both would increase. The only way income can increase in this case is for her to work more, so we must conclude that her extra hour per day from the shorter commute is divided in some way between more work and more leisure. Therefore, she works more.

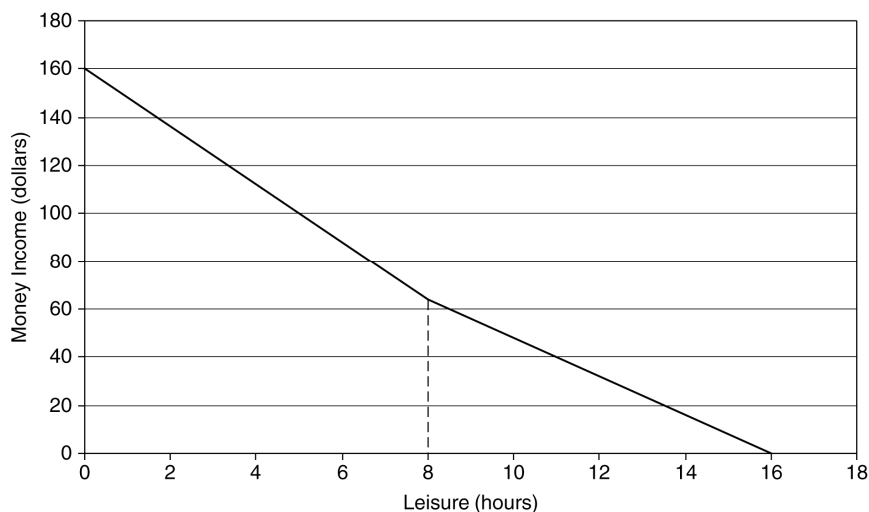
4. The federal minimum wage was increased on July 24, 2007 to \$5.85 from \$5.15. If 16 hours per day are available for work and leisure, draw the daily budget constraint for a worker who was earning the minimum wage rate of \$5.15 and the new budget constraint after the increase.

**Answer:**



6. Stella can work up to 16 hours per day at her job. Her wage rate is \$8.00 per hour for the first 8 hours. If she works more than 8 hours, her employer pays “time and a half.” Draw Stella’s daily budget constraint.

**Answer:**



Stella's earnings are equal to the following:

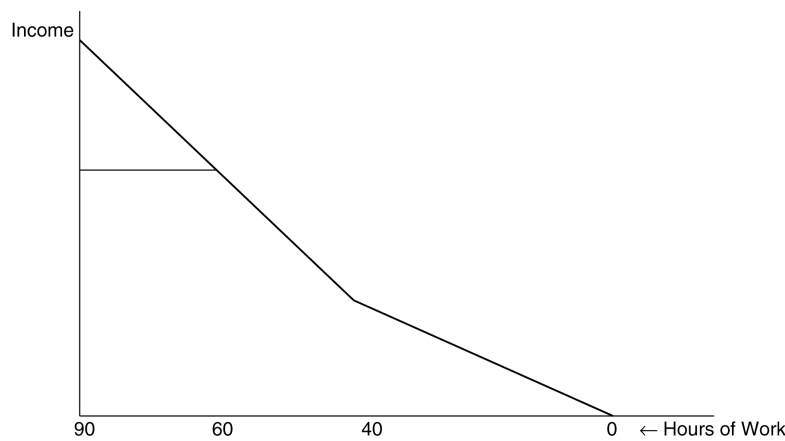
$$[\text{Number of hours (within first 8 hours)} \times \$8] + [\text{Number of hours (among next 8 hours)} \times \$12].$$

The budget constraint for the first 8 hours of work is the segment to the right of the dotted vertical line at 8 hours. The budget constraint for subsequent hours of work is the segment to the left of the dotted vertical line at 8 hours.

## ■ Suggested Essay Questions

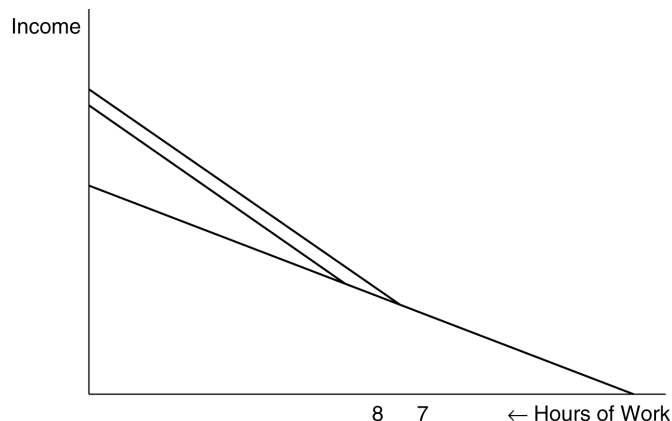
- Currently, the U.S. Department of Transportation has a rule that allows commercial truck drivers to drive up to 90 hours per week; after 40 hours per week, drivers' hourly pay goes up by 50%. A proposed rule would reduce this limit to 60 hours per week. Assume truck drivers currently drive more than 60 hours per week. Ignoring the safety aspects of the proposed rule, use economic theory to analyze the likely effects of this new rule on the utility of truck drivers. Use a graph to support your analysis.

**Answer:** The constraint created by this new law looks like the one below. Anyone with a utility-maximizing point along the more steeply-sloped segment *and above the horizontal line* (that is, anyone working—by choice—more than 60 hours per week) will be made worse off by this new regulation.



- Suppose a country passes a law that cuts the standard work day from 8 to 7 hours. Overtime (hours worked per day beyond the “standard” workday) in this country is paid at 50% above the normal wage rate. Please answer the following questions related to the work incentives facing workers in this country:
  - Draw the old budget constraint (in leisure/income space), showing the overtime premium after 8 hours of work per day.
  - On your diagram in (a), draw in the *new* budget constraint.
  - Use your diagrams in (a) and (b) to analyze the change in work incentives facing workers in this country as a result of this new law.

**Answer:**



For those already working overtime, there will be pure income effect reducing overtime hours. For those working between 7 and 8 hours before, there will be a wage increase, producing both income and substitution effects; these effects will tend to work in opposite directions, producing an ambiguous prediction for hours of work (except for those working exactly 7 hours before; for them, the substitution effect dominates and more hours of work will be offered).

For those working a bit less than 7 hours before, some will now work overtime (more than 7 hours); others working less than 7 hours may have such steep indifference curves that their labor supply behavior will be unaffected.