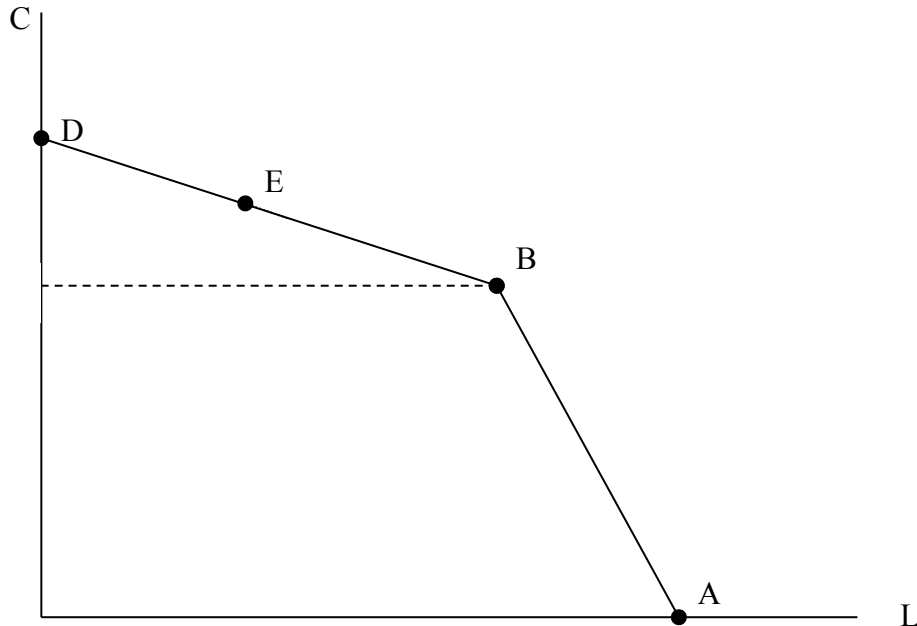


1. The graph below depicts the budget set for a worker who faces a progressive income tax schedule. The worker's wage rate is w . The marginal tax rate on the first $\bar{Y}$ dollars of income is equal to zero. The marginal tax rate on every additional dollar is t_0 %. The worker derives utility from consumption (C) and leisure (L). All the usual assumptions (downward sloping and convex indifference curves, C and L both normal goods, etc.) apply.



- What is the slope of the budget line on the segment AB? What is the slope of the budget line on the segment BD?
- For this part only**, assume that the worker's utility function is $U(C, L) = L^\alpha C^{1-\alpha}$. What conditions must the parameter α satisfy (in terms of the wage w , the endowment of leisure T , the tax rate t_0 , and the level of tax-exempt income $\bar{Y}$) for the worker to choose exactly point B?
- The government is considering a cut in the marginal income tax rate, from t_0 to $t_1 < t_0$. What effect will this policy have on the labor supply of a worker who prior to the tax cut chose point B? What effect will the policy have on the labor supply of a worker who prior to the tax cut chose point E?
- An alternative proposal is to maintain the tax rate unchanged, but to raise the level of income that is exempt from taxes from $\bar{Y}$ to $\bar{Y}' > \bar{Y}$. What effect will this policy have on the labor supply of a worker who prior to the tax cut chose point B? What effect will the policy have on the labor supply of a worker who prior to the tax cut chose point E?

2. A worker draws utility from consumption and leisure. The worker allocates her time between leisure and work, but to reach her workplace she must commute C hours. The worker does not draw any utility from commuting. Assume that the monetary costs of commuting are negligible. For each one of the following statements, state the correct answer and explain in full.
- a) A decrease in commuting time raises the number of hours of work. **True/False/Uncertain.**
 - b) A decrease in commuting time raises the worker's reservation wage. **True/False/Uncertain.**

3. Firm A is a competitive firm in both the product and input markets. It produces output (Y) using capital (K) and labor (L), using the following (CES) production function:

$$Y = \left[\alpha K^{\frac{\sigma-1}{\sigma}} + (1-\alpha)L^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

The firm can hire any amount of labor at the wage rate w , and any amount of capital at rental rate r .

- Write down the first order conditions for the firm's cost minimization problem.
- If the ratio of factor prices w/r increases by 1% and the firm wants to continue to produce the same amount of output, by how much will the ratio L/K change?
- Draw on the same graph a representative isoquant for Firm A when $\sigma = 3$ and when $\sigma = 1/3$. [You don't have to draw these exactly, just sketch what they look like relative to one another].

4. A researcher is interested in estimating the effect of subsidized childcare on the labor supply of low-skill mothers. In 2005, State A passed a law that granted fully subsidized child care for children under the age of 2, but only for mothers with 10 or less years of schooling. The researcher collects data on the employment rates of mothers in State A and in neighboring State B, for different demographic groups.

The data on average employment rates (for mothers with 10 or less years of schooling) is summarized in the following table:

State	Age of youngest child	Employment rate, 2003-2004	Employment rate, 2006-2007
A	Less than 2	25.0%	28.2%
A	3-4	38.9%	39.1%
B	Less than 2	24.6%	25.1%
B	3-4	37.7%	38.2%

- a) Why is a simple before-after comparison of employment rates of mothers with children less than 2 *not* likely to yield an unbiased estimate of the effect of the law?
- b) Assume that states A and B are identical in all respects, and faced the same macroeconomic conditions throughout the period, except for the fact that State B did not subsidize childcare. What strategy would you use to estimate the effect of the law? Explain clearly, and calculate the effect of subsidized childcare on mother's labor supply.