Public Economics (ECON 131)
Section #4: Labor Income Taxation

September 22 to 27, 2016
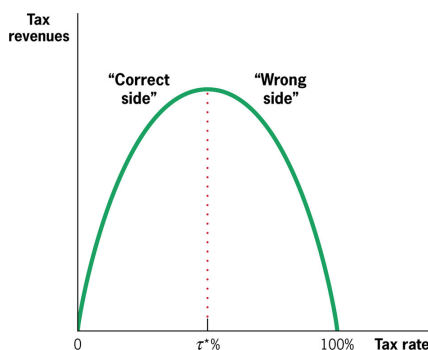
Contents

1   Implications of Tax Inefficiencies for Optimal Taxation

1.1   Key concepts

- How should the government determine the taxes?

    - Smooth tax rates, consider equity-efficiency tradeoff

    - Optimal taxation

        (a) Optimal Commodity Taxation (Ramsey Rule): $\frac{MDWL_i}{MR_i} = \lambda$ and $\tau_i^* = -\frac{1}{\eta_i} \times \lambda$

        (b) Optimal Income Taxation: $\frac{MU_i}{MR_i} = \lambda$

- The Laffer curve:

- Tax-benefit linkages:

    - Direct ties between taxes paid and benefits received.

    - Link between payroll and social insurance benefits causes the incidence of payroll taxation to fall more on workers.

    - Also, the efficiency cost of financing social insurance may be lower than presumed.

    - Perfect linkages: taxation with no deadweight loss due to linkages.
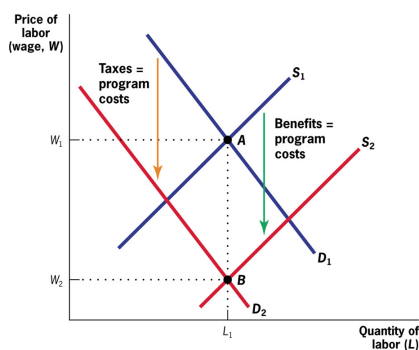
1.2   Practice problems

1.2.1   Gruber, Ch.20, Q.8

Luxury goods often have much higher elasticities of demand than do goods purchased by a broad base of people. Why, then, are governments more likely to tax luxuries than these "staple" goods?

Solution:

- While the Ramsey Rule would suggest taxing goods that are inelastically demanded, thus minimizing deadweight loss, there are other factors to consider; in particular, equity concerns are often inconsistent with this implication of optimal taxation.

- A tax on inelastically demanded staples such as food would be regressive. Poorer people would spend a higher proportion of their income on necessities, so they would bear a disproportional share of a tax on those items.

- Wealthy people are much more likely to purchase luxury items, so the direct effects of a tax on these goods would be progressive.

- Indirect effects, like employment in the sectors that produce and service luxury goods, might have implications for equity and efficiency.

1.2.2   Gruber, Ch.20, Q.14

What is the theoretical justification for a so-called Laffer curve? Based on the empirical evidence described in the book, should the U.S. raise or lower its tax rates in order to increase tax revenues? Explain.

Solution:

- The Laffer curve illustrates the theory that work disincentives associated with high tax rates will offset the revenue gains the high rates might generate. According to this theory, at very low tax rates, workers will choose to work in order to generate income. These low taxes raise revenue because they are assessed on a large base.

- As tax rates increase, however, the tax base will eventually begin to shrink. The tax base is the number of hours workers choose to work times their wages. As taxes increase, workers cut back on hours worked, reducing the size of the tax base and ultimately the total tax revenue generated. When the tax rates are so high that this revenue reduction occurs, a government can raise more revenue by reducing tax rates, since the tax base would increase as a result of higher after-tax wages.

- It is clear that a tax of zero will raise no revenue and that a 100% marginal tax rate will completely deter work. It is not completely clear, however, where in the wide range between zero and 100% the work deterrence effects of a high marginal tax rate offset the revenue generation of high taxes.

- The evidence cited in the book suggests that higher tax rates would increase tax revenues because the country is currently operating on the upward sloping portion of the Laffer curve.

2 Labor Income Taxation

Public economists are interested in problems where the choice variables for the consumer are consumption and leisure. When this is the case, the budget constraint differs from the standard case in micro since income is no longer exogenous, but chosen by the consumer through their labor. In this section, we will consider how the budget constraint of the consumer changes in response to labor income taxes, and how this may affect choices of consumption and leisure.

2.1 Key concepts

- Income and substitution effects

- Earned Income Tax Credit

    - Understand what it is
    - Understand how it impacts the budget constraint
    - Know how to draw EITC budget constraint
    - Income and substitution effects on different portions of EITC budget constraint (Phase-in, flat, phase-out)

2.2   Practice problems

2.2.1   Gruber, Ch.21, Q.1

Suppose that for every hour you work you can earn $10 before taxes. Furthermore, suppose that you can work up to 16 hours per day, 365 days per year. Draw your annual budget constraint reflecting the consumption-leisure trade-off under the following income tax schemes.

(a) A flat income tax of 20% on all income earned

(b) An income tax where you pay no tax on the first $10,000 earned and a tax of 25% on all income over $10,000.

(c) An income tax where you pay 10% on the first $5,000 earned, 20% on the next $10,000 earned, and 30% thereafter.

Solution:

To determine the y-intercept, calculate the total amount of income you could earn if you worked all hours possible at a wage of $10: $16 \times 365 \times \$10 = \$58,400$.

To determine the x-intercept, calculate the total hours from which you can choose labor or leisure: $16 \times 365 = 5,840$

Given these two points we can draw the original, no tax, budget constraint.

(a) A flat rate of 20% changes the y-intercept to $16 \times 365 \times (80\% \times \$10) = \$46,720$.

  The slope of the budget constraint changes from -10 to -8 because the after-tax wage is only $8 per hour.
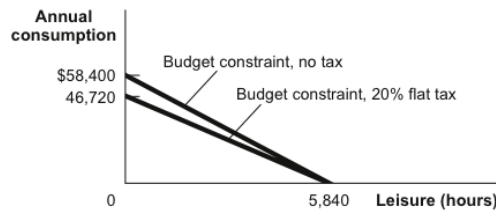
(b) This budget constraint will have two segments with:

  - A slope of -10 at income less than $10,000 and labor less than 1,000 hours (4,840 hours or more of leisure).

  - A slope of -7.5 at income greater than $10,000 and leisure less than 4,840 hours.
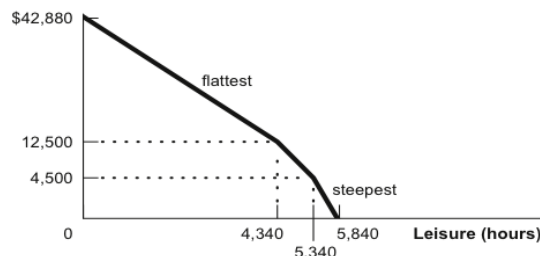
  The y-intercept is total possible income: $\$10,000 + 7.5 \times 4,840 = \$46,300$.
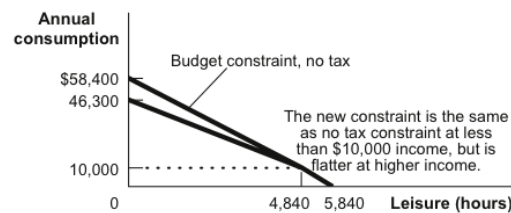
(c) This budget constraint will have three segments:

  - One with slope -9 at income of $5,000 or less (and leisure of 5,340 hours or more)

  - One with slope -8 at income between $5,000 and $15,000

  - One with slope -7 for income above $15,000 and leisure less than 4,840 hours.

  The y-intercept is $9 \times 500 + 8 \times 1,000 + 7 \times 4,340 = \$42,880$.

2.2.2   Gruber, Ch.21, Q.7

Suppose that you can earn $16 per hour before taxes and can work up to 80 hours per week. Consider a tax increase from 10% to 20% over all income.

(a) On the same diagram, draw the two weekly consumption-leisure budget constraints reflecting the two different tax rates.

(b) Draw a set of representative indifference curves such that the income effect of the tax increase outweighs the substitution effect.

(c) Draw a set of representative indifference curves such that the substitution effect of the tax increase outweighs the income effect.

Solution:

(a) The maximum weekly consumption, in dollars, without a tax is $80 \times \$16 = \$1,280$.

A 10% tax reduces that amount to $0.9 \times \$1,280 = \$1,152$, and a 20% tax reduces it to $0.8 \times \$1,280 = \$1,024$. These give the y-intercepts of the budget constraints.

The x-intercept, measuring leisure, is always 80 hours.
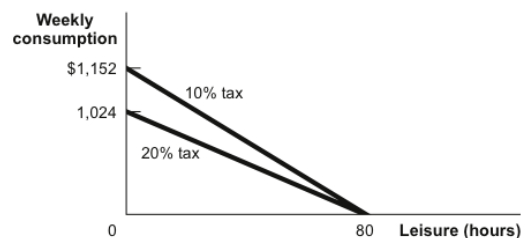
(b) When the income effect outweighs the substitution effect, a higher tax leads to less leisure because a lower income induces a person to acquire less of a normal good, in this case leisure:
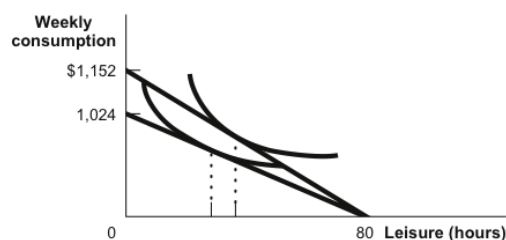
(c) When the substitution effect outweighs the income effect, a lower tax leads to less leisure be-
cause leisure now has a higher opportunity cost (the higher after-tax wage):
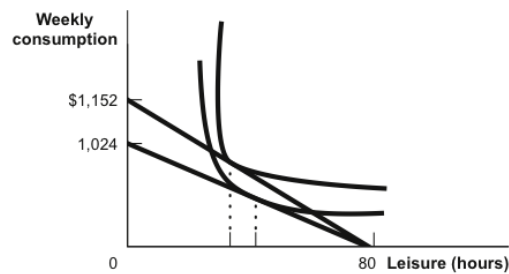
2.2.3   Gruber, Ch.21, Q.13

*You graduate from college and take a job at a consulting firm with a wage of $25 per hour. Your job is
extremely flexible: you can choose to work any number of hours from 0 to 2,000 per year.*

(a) *Suppose there is an income tax of the following from:*

  - *Income up to $10,000: no tax*

  - *Income from $10,000-$30,000: 20% tax rate*

  - *Income from $30,000 up: 30% tax rate*

  *Draw a graph in hours worked/consumption space, showing your opportunity set with and without the
  tax system. With the tax system in place, are there any points that you are particularly unlikely to choose?
  Why or why not?*

(b) *Say you choose to work 1,500 hours per year. What is your marginal tax rate? What is your average tax
rate? Do these rates differ? Why or why not?*

(c) *Suppose that the two tax rates are increased to 25% and 50% . What is the likely effect on the labor supply
of men? What is the likely effect on the labor supply of married women? Explain how the responses might
differ between these groups, both in terms of underlying economic effects and in terms of the empirical
evidence on labor supply responses.*

Solution:

(a) With an hourly wage of $25, the points of interest in the labor/leisure budget constraint will
be $10,000 and 400 hours of labor (1,600 hours of leisure) and $30,000 and 1,200 hours of labor
(800 hours of leisure).

The slope of the budget constraint is:

  - At leisure of more than 1,600 hours is the wage of 25

  - At leisure between 1,600 and 800 hours is 80% of the wage or 20

  - At less than 800 hours of leisure is 70% of the wage or 17.5

The y-intercept will be $10,000 + 0.8 \times \$20,000 + 0.7 \times \$20,000 = \$40,000$.
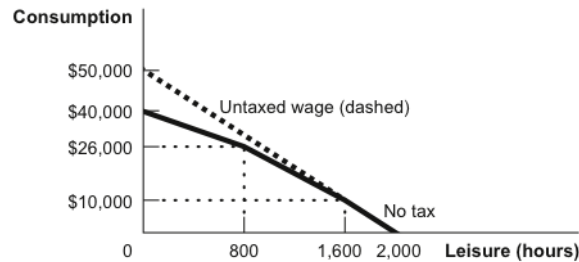
There are no points that you are particularly unlikely to choose because there are no sharp discontinuities or perfectly flat portions of the budget constraint. A marginal tax rate of 1 (or even greater!) would completely discourage work, but there are no such tax rates in this system.

(b) Marginal tax rate: Working 1,500 hours per year would yield an income of $1,500 \times \$25 = \$37,500$ and would put you in the highest tax bracket, with a marginal tax rate of 30%.

Average tax rate: To calculate the average tax rate, divide total taxes paid by income. The first $10,000 of income is untaxed; the next $20,000 of income is taxed at the rate of 20%, or $4,000; the remaining $7,500 is taxed at the rate of 30%, or $2,250. Thus total taxes are $6,250. The average tax rate is $6,250/37,500 \approx 16.67\%$.

The marginal tax rate is higher than the average tax rate because the progressive structure of this tax system taxes the last dollar earned at the highest rate; the average tax rate includes the lower marginal rates paid on the first $30,000 of income.

(c) The 25% rate is a slight increase over the current 20% rate; the 50% rate is 20 percentage points higher than the original tax rate for the higher bracket.

The labor supply of men is generally thought to be inelastic: the empirical estimate of elasticity is approximately -0.1. This inelasticity suggests that the labor supply of men would be minimally affected by this change.

The labor supply of married women, though, has been estimated to be much more elastic: a higher tax rate would tend to reduce their work hours by more.

These predictions based on empirical evidence are supported by economic theory. Secondary earners (historically, married women) face high marginal tax rates even if they earn low wages, since the primary earner's income pushes the family into a higher tax bracket. This provides a strong disincentive to work, particularly if the secondary worker has home production alternatives such as child care.