INCOME TAXES

We have looked at the effects of government spending, and we now turn to the effects of changes in income tax rates. Two of the most important tax reforms in the recent past are the Kennedy tax cut in 1964 and the Reagan tax cut in 1982. Of course, not all tax measures lead to lower tax rates. For example, Congress enacted an income tax surcharge in 1968 to raise revenue required by the escalation of the Vietnam War, and in 1990 and again in 1993 taxes were raised to lower the deficit. In this chapter we study the effects of income taxes on economic activity.

Budget Constraint Issues

An increase in the income tax rate will typically raise tax revenue. From the government budget constraint, the increase in tax revenue must be used to raise spending, to lower the deficit, or to lower some other tax. To focus attention on the effect of changes in the tax rate, we assume that government spending is unchanged, there is no deficit, and the money supply is constant. This means that a change in the income tax rate must be accompanied by a change in other taxes, and we let lump sum taxes change. In the U.S. the standard and personal exemptions are close proxies for a lump sum tax. So to be concrete, we assume here that an increase in the personal exemption offsets the effect of the higher income tax rate on total tax revenue. When taxes are changed and total tax revenue stays the same, the tax change is said to be revenue neutral.

To see how this works, suppose that an individual household's income is $30,000 a year, the personal exemption is $3,000, and the income tax rate is 10%. The tax payment for this household is
tax payment = $(30,000 - 3,000) \times (.10) = 2,700$

Now, let the income tax rate increase to 15%, and, for simplicity, assume that the household's before-tax income stays the same. Without a change in the exemption, the household's tax payment will increase to $4,050 = (30,000 - 3,000) \times (.15)$. To return the household's tax payment to $2,700 and render the tax change revenue neutral, we must raise the exemption. It must increase to $12,000 so that we would have $(30,000 - 12,000) \times (.15) = 2,700$.

Some income tax changes are temporary and some are permanent. In practice it is hard to tell if any particular change in rates will last, just as it is often difficult to identify temporary and permanent changes in government spending. The provisions of the 1986 tax reform were advertised as permanent, but were altered in 1990 and then again in 1993. Will these changes be reversed in 1996 or 1998? Nevertheless, to simplify our analysis we concentrate on the case of a permanent change in income tax rates. It is a good exercise to imagine how the results would differ if the changes were thought to be temporary. Also to simplify matters, but without losing the main point, we assume that there is no interest rate effect on work effort. This means that an increase in the interest rate will not affect output, and this makes the aggregate supply curve, $Y^*$, vertical.

Even with the above simplifications, the effects of changes in the income tax rate are fairly complicated. A change in rates affects the net reward from working and this produces a substitution effect that alters labor supply. The net return from savings is also affected and this produces an intertemporal substitution effect that changes consumption demand. Since changes in tax rates are complicated, we attack this problem in parts to make it manageable. We first look at the case where the income tax rate on labor income only increases, and then separately consider the effects of an increase in the income tax rate on interest income only. Once we understand how each effect works, we combine the two.

**A Tax on Wage Income Only**

A change in the income tax rate changes incentives. For instance, suppose you earn $500/week and the income tax rate is 30%. Each additional week that you work nets you $350
after taxes. Now suppose the income tax rate increases to 40%. The take home pay from the last week of work falls to $300. This makes it less attractive to work that last week and more attractive to take two weeks of vacation instead of on. The tax hike gives you an incentive to substitute leisure for work effort and the supply of labor declines. So, a change in the income tax rate produces a substitution effect exactly like the one caused by a change in the real wage rate.

You may think that if your take home pay is reduced you will want to work more in order to regain some of the lost income. The increase in income tax rates has lowered your wealth, and a decrease in wealth encourages additional work effort. However, remember that the personal exemption is also higher, and you reap the benefit of the higher exemption no matter how many hours you work. Since the tax change keeps tax revenue constant, the adjustment in the value of exemptions is just sufficient to keep your total tax payment the same. This means that there is no wealth effect from a change in the income tax rate that is revenue neutral. There is only a substitution effect, and the substitution effect leads to a decrease in work effort.

What are the consequences of this tax change? An increase in the income tax rate reduces the supply of work effort, and so shifts the $Y^s$ curve back and to the left. Since households will produce less output and their tax payments are the same, their disposable income falls. Moreover, this change is permanent. A permanent decline in income still produces a one for one fall in consumption. Graphically this means that the $Y^d$ curve shifts downward and to the left by the same amount as the shift in the $Y^s$ curve.

These shifts and their effect on the equilibrium interest rate and real output are shown in Figure 17.1. An increase in the income tax (remember, on wage income only) lowers output, consumption, and work effort; but the interest rate is unaffected. Since the interest rate doesn't change, investment stays the same. These results are recorded in Table 17.1.
A Tax on Interest Income Only

We now turn to the effect of an increase in the tax rate on interest income. A tax on interest income lowers the reward to savings. For example, suppose the interest rate is 15%, the income tax rate 25%, and you are considering saving an additional $1,000. The interest income from this additional savings will be $112.50 after taxes. If the tax rate on interest income increases to, say, 40%, then you would get to keep only $90 of your interest income. Your after-tax return falls from 11.25% to 9%. In general, the after-tax return, $r^a$, is given by

\[ r^a = r(1-\tau) \]

where $\tau$ is the income tax rate on interest income.

When the income tax rate on interest income increases, the reward to savings falls, and people will want to save less. This, in turn, causes consumption to increase and this shifts the $Y_d$ curve out and to the right. By the assumption of a perfectly inelastic supply of output, the vertical $Y^s$ curve, there is no change in output. The tax change therefore produces an initial excess demand for current goods and the interest rate rises. This is pictured in Figure 17.2. The higher interest rate still discourages investment, so on net consumption rises and displaces some investment. These results are also gathered in Table 17.1.

A General Income Tax

A general income tax increase is an increase in the income tax rate on both interest and wage income. To find the effect of a general income tax rate increase, we just combine the two effects that we've already studied and this is done in the last column of Table 17.1.
A general increase in the income tax rate will lower work effort, lower output, and raise the interest rate. The increase in the interest rate lowers investment spending, but the combined effect on consumption is a question mark. The tax hike on wage income discourages consumption, but the tax hike on interest income favors current consumption. Without knowing the sizes of the two effects, we cannot predict the combined or total effect on consumption.

Why do these tax changes have these kinds of effects? Remember the experiment that we are carrying out here. The government increases the income tax rate, but at the same time lowers lump sum taxes to keep tax revenue constant. The natures of the two taxes differ in important ways. There is no escape from a lump sum tax. Whether you work hard or whether you're lazy, whether you consume today or tomorrow, it doesn't matter. The amount of the lump sum tax stays the same. This is not true for an income tax. The amount of income tax you owe depends on how much income you earn. You can therefore lower your tax burden by working and earning less. This distorts incentives. It is the change in the incentives to work and save that causes the effects from a change in the income tax rate. An income tax distorts these incentives while a lump sum tax does not.

Why then do we have income taxes? The answer is for the sake of fairness or equity. A lump sum tax does not change incentives because it is not tied to any of the characteristics of the household. However, to most people the characteristics of the household matter for tax purposes. Most people believe that households with higher incomes ought to pay higher taxes, and this is exactly what an income tax does. There is thus a trade-off between the distortions introduced by an income tax and the lack of fairness of lump sum taxes.
An Increase in Spending Financed by Higher Income Tax Rates

In the previous chapter we discussed the effects of a permanent increase in government spending that was financed by higher lump sum taxes. In practice, higher spending is often financed by higher income tax rates instead of higher lump sum taxes. We can combine the results of this chapter and the last to find the effects of such a policy mix.

Table 17.2 summarizes the effects of an increase in the income tax accompanied by a decline in lump sum tax, and it also includes the effects of an increase in government spending financed by an increase in lump sum taxes. If we put these together, we get the effects of an increase in government spending financed by a general increase in the income tax rates. These effects are shown in the third column of Table 17.2.

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<tr>
<th>Table 17.2</th>
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There are mostly question marks in column three. To know whether or not output will increase you need to know the relative strengths of the opposing effects. For example, if the wealth effect is weak, but the substitution effect is strong; output and work effort will both fall. On the other hand, if the two effects are about the same size, output and work effort will stay about the same. Many of the controversies over fiscal policy and its effects can be traced to disagreements about the size of the various effects. Unfortunately we do not yet have enough information about magnitudes to come to a consensus on the combined effect.

The Laffer Curve
We have so far assumed that higher income tax rates generate higher tax revenue, but this need not be the case. Tax revenue equals the average tax rate times the taxable income, which is often called the tax base. In symbols

\[
\text{tax revenue} = (\text{average tax rate}) \times (\text{tax base})
\]

The relationship between the tax rate and tax revenue is shown in Figure 17.3. This curve is called the Laffer curve after the economist Arthur Laffer who, among others, popularized this idea in the early 1980s.

To see why the curve takes its shape, first suppose that the average tax rate is zero. In this case tax revenue must also equal zero. Now suppose the average tax rate was 100%. Again tax revenues would be zero because no one would work, or at least report any of their income. In between zero and 100% we can observe tax revenue being raised, so there is a positive portion of the Laffer curve. In general, higher tax rates lower the tax base. When rates increase people tend to work less, or to put more effort into finding ways, legal and otherwise, to lower their tax burden. If the tax base declines by a greater proportion than the average tax rate increases, tax revenues will fall. This happens on the downward sloping portion of the Laffer curve.

A country's position on the Laffer curve is an empirical matter. It appears that most countries are on the upward sloping part of their Laffer curves so that higher tax rates do raise revenue. However, some have argued that for people in higher tax brackets the response to higher tax rates is stronger so that higher taxes on the rich will not succeed in generating substantial new revenues. This remains an unsettled topic.

**Summary**
Income taxes distort behavior by changing the incentives to work and save. Revenue neutral increases in income tax rates lower work effort, output, and investment. When increases in spending are financed by higher tax rates it is important to know something about magnitudes to predict effects on output, work effort, and other variables. The Laffer curve throws a potential wrench into the analysis since it shows that higher tax rates may not be successful in producing more tax revenue.

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**Review Questions**

1) The average starting salary for a graduate of the school of business is somewhere around $24,000. In figuring federal income taxes the typical graduate can deduct from his gross income $2,300 for one personal exemption, and $3,600 for the standard exemption. These are, more or less, "lump sum" deductions. The taxable income is just the difference between gross income and the sum of the value of the exemptions. The average and marginal tax rate for this taxable income bracket is 15%.

   a) Calculate the income tax liability for the average graduate.

   b) The Social Security and Medicare tax is 7.65%. This is assessed on your gross income of $24,000. Calculate the value of this tax liability. (Note that this is just the employees contribution. The employer contributes an equal amount that would presumably be included in salary otherwise.)

   c) In Ohio the state income tax is about 4% of your gross income, and Oxford has just increased its income tax to 1.75% of gross income. Calculate these taxes.

   d) Sum up all the taxes and find the average tax rate. This is an underestimate because some taxes have been left out. For example, sales tax, property taxes, federal excise taxes on gas and liquor have been excluded.

2) Suppose that the general income tax rate decreases, but the exemption is changed to keep tax revenue constant. Then,

   a) investment will increase

   b) output will not change

   c) the interest rate will rise

   d) consumption declines
3) What is the effect on the price level of a revenue neutral increase in the income tax rate? Provide a graphical analysis.

4) Suppose that there is a permanent increase in the income tax rate to finance a permanent increase in government spending. Assume that the spending does not fall on public capital. What is the effect of this spending on output, investment, consumption, the interest rate, work effort, and the real wage?

5) Suppose that when the income tax rate is 60% tax revenue is $12 billion. When the income tax rate increases to 75%, tax revenue falls to $10 billion. What does this imply? Draw a diagram to illustrate your answer.