The early 1980s heralded the beginning of the most sweeping changes in the tax system witnessed in the United States since the end of World War II. The process culminated in the enactment of the landmark Tax Reform Act (TRA) of 1986. The legislation was promulgated with the firm belief that the current tax system had significant disincentive effects upon the supply of labor. Accordingly, proponents for the legislation argued that reducing tax rates therefore would encourage Americans to work harder and, in doing so, help foster economic growth.

In this chapter we show how the static theory of labor supply, developed in Chapter 26, can be used to furnish both a deeper understanding of the effects of changes in the income tax rate on effort.

### 27.1 Taxation and Labor Supply

With the election of Ronald Reagan as the 40th president of the United States, the early 1980s ushered in a period of profound changes in U.S. economic policy. The era witnessed the ascendancy of supply-side economics from a collection of more or less coherent theoretical arguments, to ones of the greatest immediate practical relevancy. Chief among the reforms were dramatic changes in the U.S. tax code. By 1984, the Economic Recovery Act of 1981 had slashed personal tax rates for the most affluent members of society from 70% to 50%. The tax reforms culminated in the monumental Tax Reform Act of 1986 which further reduced income tax rates for the wealthiest from 50% to 28%, eliminated them altogether for the poorest members of society, and instituted a wide array of other simplifications to the tax code. Because of these reforms, the 1980s have aptly been dubbed the tax decade.
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The economic ethos underlying the reforms was disarmingly simple. Then President Ronald Reagan, in a letter to congress accompanying his tax-reform proposal, remarked, “Most Americans labor under excessively high tax rates that discourage work and cut drastically into savings.” A central pillar of supply-side economics (“Reaganomics”) is the posited link between taxes and individual labor supply—in particular, the belief that high tax rates dull work incentives. In this section, we discuss the theoretical basis of this proposition and consider its empirical legitimacy.

Taxes and the Neoclassical Model

From a theoretical perspective, the link between taxes and labor supply is a simple extension of the static labor-supply model presented in Chapter 26. In fact, the major elements of the who's who list (or more aptly but less elegantly the what's what list) remain completely unchanged. Indeed, the only difference is in the way the individual's budget constraint is formulated.

The Budget Constraint. Once again, let $A_0$ and $W$ represent initial wealth and the hourly wage rate, respectively. Let’s consider a simple tax system with neither a personal allowance nor other tax deductions (these extensions are incorporated readily enough). We assume that each worker is taxed on every dollar he earns at the constant rate $\tau$. This means that out of the $W$ earned over the hour, he keeps only $(1 - \tau) \times W$ of it. It follows that his after-tax budget constraint (i.e., his disposable income) is:

$$c = (1 - \tau) \cdot (T - \ell) \cdot W + A_0$$

(27.1)

This relationship is represented by the initial common budget line, $BP$, for three different workers in Figure 27.1. As shown, all three of the workers maximize their respective utilities by selecting point $E$, where they consume $c^*$, enjoy $\ell^*$ hours of leisure, and derive utility $u^*$. The reduction in the income tax to $\tau'$ causes each of their budget lines to pivot around point $P$ to $B'P$. The worker shown in Figure 27.1a responds to the change by choosing point $E'$. His utility increases to $u'_1$, and he works fewer hours. In contrast, the one shown in panel (b) responds by the working more hours. Finally, although the worker shown in (c) is initially a nonparticipant, she enters the labor market following the tax cut.

Figure 27.1 also decomposes the effects of the tax cut into its component income and substitution effects. In Figure 27.1a, the income effect dominates, so that the individual’s supply of labor declines following the tax cut. Exactly the opposite is true, however, in panel (b). It should already be clear from this that there are no strong theoretical a priori grounds that suggest a tax cut necessarily increases the number of hours worked by current participants.
Nevertheless, matters are quite different for nonparticipants. As shown in panel (c), the income effect is zero for the members of this group, which leaves only the work-enhancing substitution effect. As illustrated, the tax cut induces the individual to enter the labor force, which (obviously) leads to an unambiguous increase in the number of hours she works.

Numerous empirical studies have examined the consequences of tax change in general and the tax changes of the mid-1980s in particular. The broad consensus of these studies is that tax cuts have only a modest effect on total work hours. Bosworth and Burtless (1992) summarize the effects of the 1980’s tax cuts as follows:

The increase in labor supply during the 1980s provides the strongest support for supply side gains from tax reform. The growth of adult hours among adult women accelerated in the 1980s, and average hours among adult men stabilized or rose slowly after a long period of decline. Noticeable increases occurred among earners in the most affluent families, who enjoyed the largest marginal tax cuts.4

Ziliak and Kniesner (1999) develop and empirically implement a sophisticated intertemporal model of taxes and labor supply. In particular, their model accommodates the effect of the progressive nature of taxes over the life cycle. The idea is that most workers begin their careers with low earnings and, as a consequence, belong to a low tax bracket with correspondingly low marginal-tax rates. However, as their careers progress, their earnings gradually rise, and they are propelled into ever higher tax brackets. Forward-looking workers are predicted to anticipate this and adjust their behavior accordingly. The authors estimate that,
because of these intertemporal effects, the Reagan tax reforms increased labor supply by about 3%.

In Economic Application 27.1, we discuss the effects of dramatic tax change that occurred in Iceland during the 1980s, and in Economic Application 27.2, we examine the consequences of taxation on some rather unusual types of economic behavior: the timing of births and deaths.

### 27.2 Total Tax Revenues

The government’s budget deficit is a perennially newsworthy topic. Ignoring certain complications, the deficit equals the excess of government spending relative to the tax revenues it collects. Given this, it is interesting to calculate the total tax revenues, denoted $TR$, that it collects from a population of size $N$.

#### ECONOMIC APPLICATION 27.1

**Iceland’s Natural Experiment in Supply-Side Economics**

The United States is not the only country that witnessed dramatic changes in the tax code during the 1980s. Bianchi, Gusmundsson, and Zoega (2001) report a fascinating change that took place in Iceland in 1987, when it abandoned a system in which this year’s taxes were based on last year’s income in favor of a pay-as-you-go system that it implemented in 1988. The change meant that taxes were never levied on the basis of 1987’s income. To see why, observe that in 1986 taxes were paid on 1985’s income; in 1987 taxes were paid on 1986’s income and in 1988 (the year the new system was introduced) taxes were paid on 1988’s income. Individuals did pay taxes in 1987; however, they paid them on the basis of 1986’s income and no income tax was ever levied on income earned in 1987.

The change induced a striking natural experiment that can be used to isolate income and substitution effects described in the text. Given individuals actually paid taxes in 1987, the Icelandic tax reform had at best a modest income effect. However, it induced a gigantic change in the slope of the budget line (which is critical for the substitution effect) because marginal taxes fell from between 30% and 50% to zero for the year.

For working men, their evidence indicates that the tax cut led to about a 14% increase in their labor supply on average. Those working men who also earned some income from self-employment raised their labor supply by an astonishing 24% over the year. For women, the effect was still positive but smaller.

To calculate $TR$, index each person in the population by $i = 1, 2, \ldots, N$ (it is helpful to think of $i$ as the person’s Social Security number); let $\tau$ denote the income tax rate; let $W_i$ denote the person’s $i$’s hourly wage, and, finally, let $h_i \geq 0$
denote the person’s $i$’s work hours. (Nonparticipants are those individuals for whom $h_i = 0$.) The government then collects taxes of $\tau \cdot W_i \cdot h_i$ from each person.

The total tax revenue collected by the government is derived by summing the taxes collected from each of the $N$ persons in the group:

$$TR = \sum_{i=1}^{N} \tau \cdot W_i \cdot h_i$$  \hspace{1cm} (27.2)

A reduction in the income tax rate $\tau$, affects $TR$ in three distinct ways. First, all else equal, the direct effect of the cut obviously reduces $TR$. Second, current labor-market participants adjust the number of hours they work. Depending on the size of the income and substitution effects, some will work fewer hours and others will work more hours. Finally, the tax cut may induce some nonparticipants to enter the labor force, at which point they start paying income taxes.

Taken together, the increase in the number of hours worked by some current participants and the increase in the total number of participants imply that total income tax revenues, $TR$, could increase following the cut in the income tax rate, $\tau$. This observation is the basis of the famous Laffer Curve (named after Arthur Laffer) depicted in Figure 27.2. As shown, total tax revenues are maximized at $\tau^*$. This implies that if society is at a point such as $\tau' > \tau^*$, it could raise more tax revenues, $TR$, by cutting the income tax rate.\(^6\)

**ECONOMIC APPLICATION 27.2**

**Taxation—A Matter of Life and Death\(^7\)**

So far, we have considered only the effects of taxation on the supply of labor. However, taxation can affect a wide array of human activities ranging from birth, through marriage, even to death itself. The basic idea is simple. Over the course of any given year, agents are predicted to time these activities to their best advantage because they can have repercussions for total and marginal tax liabilities. Thus Morian (1990) remarks:

The doctor was trying to get him out so he could be the first baby of 1990, “but my husband was more concerned about getting him out in 1989 to use as a tax write-off,” said Annie White, who delivered the last baby of the 1980s in Gwinnett County, Ga., and obtained a $2,000 tax deduction.

The federal tax system provides strong financial incentives for parents to influence the timing of births. (Mothers can manipulate the timing of births through cesarean section and induced labor.) Thus a child born on December 31 receives all the tax benefits of being born any time in that year; a child born one day later
provides no tax benefits for that year. The magnitude of the tax incentives can be quite large. Dickert-Conlin and Chandra (1999) estimate that, “[a] single woman with $10,000 in adjusted gross income . . . in 1996 reduces her tax burden by $2,670 with the birth of her first child.”

They find the effects on births are large: a $500 increase in the tax benefit of having a child is estimated to increase the probability that the child is born in the last week of December by a staggering 26.9%.

Quite remarkably, there also may be some scope for us to exercise some choice over the dates that we shuffle off our respective mortal coils. Thus, as observed by Kopczuk and Siemrod (2003), “There is considerable evidence that the timing of death depends upon events . . . among Jews, the number of deaths was lower than expected in the week before Passover.”

Similar grim reaper rain checks appear also to be issued, with wanton abandon, around other momentous events such as the desire to witness the beginning of the new millennium. Thus Hershey (2000) reports:

For some reason, people in New York City died at a remarkably higher rate during the first seven days of 2000 as compared with the same period in 1999.

To the extent that we can alter the timing of our deaths, this raises the possibility that death itself could respond to tax incentives. This morbid possibility was explored in Kopczuk and Siemrod (2003). The authors use changes in the estate tax code governing bequests to see if these changes affected the timing of deaths. They conclude:

Our central estimate is that, for individuals dying within two weeks of a tax reform, a $10,000 potential tax saving (using 2000 dollars) increases the probability of dying in the lower-tax regime by 1.6%.

The Wealthy

For the average spectator, the legislative sport of “tax the rich” might appear to be an especially bewildering one. Thus, while the 1980s ushered in sweeping reductions in marginal tax rates, the early 1990s saw them increase again, only to decline again during the early 2000s. As Goolsbee (2000) remarks,

Concerns about inefficiency have led some to condemn the tax increases of the 1990s and praise the tax cuts of the 1980s. Concerns about rising inequality have led others to do the reverse.

The importance of evaluating the responses of the rich to changes in the tax code cannot be overstated. The top 0.5% of households, classified by income, pay approximately one quarter of all U.S. taxes.
Given the prominent share of taxes paid by the rich, it is conceivable that the government’s total tax revenues could decline à la Laffer if, following an increase in the income tax rate, their work incentives were to become sufficiently dulled.

But just what happens when you do tax the rich? Goolsbee (2000) examines this question. A notable feature of his analysis is that he carefully distinguishes between the short- and long-run effects of tax rate changes upon total reported taxable income. Goolsbee’s main finding is that the short-run tax response (i.e., over a year) is enormous and that an increase in the income tax rate leads to a reduction in taxable income. However, this is almost all explained by the rich changing the timing of their tax payments (which they accomplish by, among other things, exercising their stock options before the tax increase). As for salaries and bonuses, which depend on worker’s labor-supply decisions, the evidence indicates they are relatively insensitive to changes in the income tax rate.

Although the general consensus is that tax reforms appear only to have a modest effect on the total supply of labor hours, Martin Feldstein’s (1995) admonishment is quite apposite on this point:

> It is important, however, not to confuse changes in participation and in average hours with changes in labor supply. The amount of “labor” that an individual supplies depends also on the intensity of work, the nature of the occupation, . . . and many other dimensions all of which can be influenced by changes in tax rates. It is totally wrong to say that taxes do not affect the labor supply of men when what the data show is their participation rate and their average hours do not appear to vary in the short run.14

This suggests that deeper analysis of the effects of taxation calls for enriching the basic labor-supply model to one in which individual utility depends upon consumption, leisure, and effort.

### SUMMARY

- For current participants, a reduction in the income tax rate unleashes both income and substitution effects.
- The former effect tends to raise the individual’s demand for leisure, and the latter decreases it. Tax cuts unambiguously increase individual utility. Depending on the relative sizes of the substitution and income effects, they may result in current participants working either a greater number of hours or fewer hours.
- Reductions in the income tax rate unambiguously tend to increase the number of hours worked by current nonparticipants.
- It is conceivable that an increase in the income tax rate could actually reduce the government’s total tax revenues. This idea is encapsulated in the famous Laffer Curve, which depicts a \( \cap \)-shaped relationship between the government’s total tax revenues and the income tax rate.
Chapter 27: Policy Application: Income Taxes

PROBLEMS

P1. Does a cut in the income tax rate necessarily enhance individual work incentives?

P2. Under what circumstances might a reduction in the income tax rate actually increase total government tax revenues?

P3. In most economies, individuals are allowed a tax-exempt personal allowance in their earnings, \( Y_0 \). What is the effect on the individual’s budget constraint—given a fixed income tax rate \( \tau \)? Why might this lead to an unusual “clustering” of behavior across different people?

P4. An individual’s utility is given by \( u(c, \ell) = c \cdot \ell \), where \( c \) is his consumption and \( \ell \leq 24 \) his leisure. The individual’s unearned income is \( A_0 = $100 \), and the wage rate is \( w = $25 \) per hour. How many hours does he work if the tax rate is \( \tau = 0 \)? What happens if the tax rate increases to 25%?

Note: Given the utility function \( u = c \cdot \ell \), the marginal rate of substitution (MRS) between consumption and leisure is \( MRS = c/\ell \).

P5. From time to time, it is argued that the income tax \( \tau \) should be replaced with a consumption (sales) tax \( s \). How would this affect the typical individual’s budget constraint? Suppose that an individual’s utility is \( u = c \cdot \ell \), what is the effect of a sales tax on individual hours worked? How does this compare with an income tax \( \tau_0 \)?

Remark: Under a sales tax, each $1 of expenditures leads to $\( (1-s) \) worth of consumption.

Hint: Given the utility function \( u = c \cdot \ell \), the marginal rate of substitution (MRS) between consumption and leisure is \( MRS = c/\ell \).

NOTES

1. It is interesting to note that, according to the calculations of Hausman and Poterba (1987), the 1986 Tax Reform Act left the marginal tax rates of 40% of Americans either unchanged or even slightly higher.


5. There is even a fourth effect. It is that a reduction in tax rates may make workers less inclined to avoid taxes, either legally (by hiring accountants) or illegally (by not declaring their earnings).

6. The evidence suggests that the United States is on the upward-sloping segment of the Laffer Curve, implying that an increase in the tax rate increases \( TR \). Stuart (1981) adduces evidence for Sweden—where marginal tax rates were a staggering 80% during the 1980s—that suggest it may be on the negatively sloped portion of the curve.


References


