

## Chapter 9. Taxation & Inflation

Problems **S9.1**, **S9.2**, and the accompanying discussion are actually more related to the understanding of how tax rates affect government tax revenues than they are with the personal finance issues of a taxpayer. However, under the assumption that an educated citizen is a better citizen, it's useful to at least get a glance at this topic.

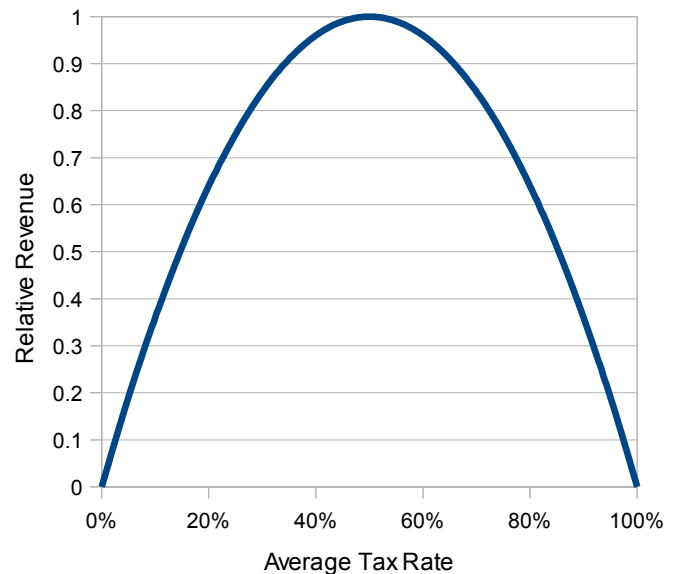
The Laffer curve, named after economist Arthur Laffer, shows some of the possible relationships between average tax rates and how much money the government brings in from taxes (its Tax Revenue). As you shall see, it doesn't tell us quantitatively how the system works, but it does bring out some possibilities..

Consider this figure of a possible Laffer curve describing the U.S. personal income tax system in a given year. What do we know about this curve that must be correct and what is just surmising?

First consider the curve's endpoints. If the average tax rate is 0% then there is no government revenue. If the average tax rate is 100% then why would anybody work? Again, there is no government revenue. Our knowledge of both endpoints seems pretty solid.

What about the curve connecting these endpoints. Must it look like the curve shown? We don't know this. There are an infinite number of curves that could connect the two endpoints. The one shown in this figure is just one very simple possibility. We do, however, know one thing more. There is, for the latest tax year, a known average tax rate and a corresponding known tax revenue number. In other words, we know one point on this curve in addition to the two end points. Now, (and you might have to sketch a bit with a pencil and paper to convince yourself of this), it is impossible to draw a continuous curve between the 0% endpoint and this known point without having some region where the revenue increases with increasing tax rate. Also, it is impossible to draw a continuous curve between the 100% endpoint and this known point without have some region where the revenue decreases with increasing tax revenue.

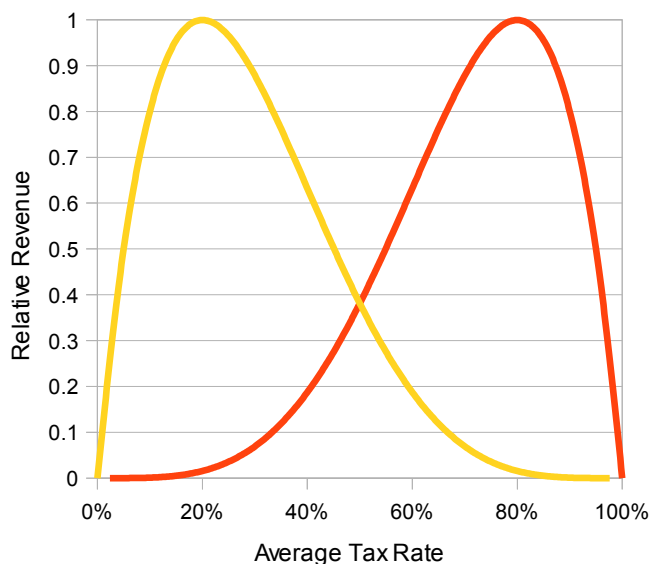
These last two assertions are fundamental to decisions about setting tax rates. Everyone agrees what last year's point on the curve was, but politicians cannot agree on just what the curve looks like.



Consider this figure, showing two possible curves.

Assume that the point we know is the point at 50% average tax rate (I labeled the vertical axis Relative Revenue and scaled it between 0 and 1 because the actual numbers aren't relevant to this discussion.)

Both curves pass through the same Revenue point at 50% tax rate. If the red curve is the “true” curve then increasing tax rates a little will result in an increase in government tax revenues. On the other hand, if the orange curve is the “true” curve then decreasing tax rates a little will result in an increase in government tax revenues.



Which curve is the true curve; or just which curve is closest to the true curve at the 50% average tax rate point? Peoples' answers to this seem to depend more on their political affiliation than their knowledge of economics. Many people think it's impossible for the orange curve to be the correct curve - it seems counterintuitive for revenues to go up when tax rates go down. If you think this way, ask yourself what would happen if the tax rate were 99.9%. Wouldn't decreasing the rate a bit increase revenues? If this is ok, what about 99.0%? Then what about 90%, then what about 80%, etc. While you might strongly believe that the orange curve in any way represents reality today, it apparently is not an impossible representation.

Before getting to the problems to be solved, I'd like to explain a bit of simplifying mathematics. Suppose there are 10 million people earning \$50,000 each a year, 20 million people earning \$100,000 each a year and 1 million people earning each \$200,000 a year. What's the average earning? Doing this the hard way, we could write down \$50,000 10 million times, \$100,000 20 million times, \$200,000 one million times, and add all of these numbers up. Then we divide the sum by the total number of people (31 million) and we have our average. This looks like a horrible task when described as I just described it, but it really simplifies nicely:

$$Average = \frac{10m(\$50,000) + 20m(\$100,000) + 1m(\$200,000)}{10m + 20m + 1m}$$

where “m” stands for “million.”

Now divide the numerator and denominator by m, and suddenly the expression isn't so daunting:

$$Average = \frac{10(\$50,000) + 20(\$100,000) + 1(\$200,000)}{10 + 20 + 1} = \frac{\$270,000}{31} \approx \$871,000$$

Keeping the above equivalence in mind, I'll state problems in terms of “ten people” and “twenty people” rather than “ten million people” and “twenty million people” just to keep the bookkeeping simple.

**S9.1** Consider the following simplified (and fictitious) distribution of taxable incomes in the U.S. In this example everybody is part of a couple filing jointly.

| <b>Nr of Couples</b> | <b>Average Taxable Income</b> |
|----------------------|-------------------------------|
| 125                  | \$8,000                       |
| 25                   | \$40,000                      |
| 10                   | \$100,000                     |
| 6                    | \$160,000                     |
| 4                    | \$250,000                     |
| 2                    | \$500,000                     |
| 1                    | \$1,000,000.00                |

a. What is the average taxable income?

Using the procedure outlined above, the average taxable income = \$40,231.

b. Using the tax table for married couples filing jointly in chapter 9, what is the tax paid by each couple, what tax bracket is each couple in, and what is the average tax rate for each couple?

| <b>Nr of Couples</b> | <b>Average Taxable Income</b> | <b>Tax</b> | <b>Tax Bracket</b> | <b>Average Tax Rate</b> |
|----------------------|-------------------------------|------------|--------------------|-------------------------|
| 125                  | \$8,000                       | \$800      | 10.0%              | 10.0%                   |
| 25                   | \$40,000                      | \$7,364    | 15.0%              | 18.4%                   |
| 10                   | \$100,000                     | \$17,688   | 25.0%              | 17.7%                   |
| 6                    | \$160,000                     | \$33,544   | 28.0%              | 21.0%                   |
| 4                    | \$250,000                     | \$61,229   | 33.0%              | 24.5%                   |
| 2                    | \$500,000                     | \$146,575  | 35.0%              | 29.3%                   |
| 1                    | \$1,000,000.00                | \$321,575  | 35.0%              | 32.2%                   |

c. What percent of the total tax does each couple pay, what percent of the total tax does each group pay?

The total tax paid is \$1,521,891. Breaking it down by couples and by groups:

| <b>Nr of Couples</b> | <b>Average Taxable Income</b> | <b>Tax</b> | <b>% Total Tax per Couple</b> | <b>% Total Tax per Group</b> |
|----------------------|-------------------------------|------------|-------------------------------|------------------------------|
|----------------------|-------------------------------|------------|-------------------------------|------------------------------|

|     |                |           |        |        |
|-----|----------------|-----------|--------|--------|
| 125 | \$8,000        | \$800     | 0.05%  | 6.57%  |
| 25  | \$40,000       | \$7,364   | 0.48%  | 12.10% |
| 10  | \$100,000      | \$17,688  | 1.16%  | 11.62% |
| 6   | \$160,000      | \$33,544  | 2.20%  | 13.22% |
| 4   | \$250,000      | \$61,229  | 4.02%  | 16.09% |
| 2   | \$500,000      | \$146,575 | 9.63%  | 19.26% |
| 1   | \$1,000,000.00 | \$321,575 | 21.13% | 21.13% |

The data used in this problem is artificial – a polite way of saying that I made it up. The distribution of incomes, however, is close to reality. The results are counter-intuitive to many people:

The one millionaire pays about three times as much tax as the 125 people in the lowest bracket. For that matter he/she pays more than all 150 people in the lowest three brackets combined.

The people in the top earning three brackets, amounting to  $7/173 = 4\%$  of the people, pay about 56% of the total taxes.

Whether these results are good social policy, are good for the future of the economy, etc., are topics which I will not venture into.

**S9.2 a.** Using the same data as problem S9.1, what is the average tax rate for the entire population?

The total income for the 173 person group is \$5.960 million dollars. The total amount of taxes paid is (rounded a bit) \$1.522 million dollars. The average tax rate is therefore  $1.522/5.960 = 21.9\%$ .

**b.** Consider the second figure above (the figure with two Laffer curves). If we increased tax rates so that the average tax rate went up a percent or two, what would happen to tax revenues in each of the two situations depicted?

For the red curve, with an Average Tax Rate of about 22%, clearly an increase in tax rates would result in an increase of Tax Revenues. For the yellow curve, 22% is just about the peak of the curve. Increasing the Average Tax Rate (or, for that matter, decreasing it) would result in a reduction of Tax Revenue.

**c.** If the government severely increased income taxes – i.e. doubled all tax rates – approximately what would happen to tax revenues?

For the red curve, the relative revenue would jump from about 3% to about 24%, i.e. tax revenues would increase about a factor of 8. For the yellow curve, revenues would decrease from 100% to about 50%, i.e. tax revenues would cut in half.