

## **Chapter 2 – Tools of Positive Analysis**

### **Brief Outline**

1. The Role of Theory
2. Causation versus Correlation
3. Experimental Studies
  - a. Conducting an Experimental Study
  - b. Pitfalls of Experimental Studies
4. Observational Studies
  - a. Conducting an Observational Study
  - b. Pitfalls of Observational Studies
5. Quasi-Experimental Studies
  - a. Conducting a Quasi-Experimental Study
  - b. Pitfalls of Quasi-Experimental Studies
6. Conclusions

### **Answers to End-of-Chapter Questions**

1. A change in the marginal tax rate changes the individual's net wage. This generates both an income effect and a substitution effect. As long as leisure is a normal good, these effects work in opposite directions. Hence, one cannot tell *a priori* whether labor supply increases or decreases. If there were no political or legal impediments, an experimental study could be conducted in which a control group confronts the status quo, and an experimental group faces the new tax regime. Other things that affect work effort would impact both the control group and the experimental group, so any difference in work effort between the two groups could be attributed to the change in marginal tax rates.
2. This is a valid criticism of the study of New York Homelessness. It reflects the problem of causality. Two things may be correlated, but it can be difficult to determine which causes the other. The remedy would be to set up a study in which individuals are randomly assigned to groups. In an experimental study, the group offered job training, counseling services, and emergency money would not necessarily be more motivated than a group not signed up for those services, so if they do not become homeless, it could be attributed to the programs.
3. The workers who spend time on a computer probably have other skills and abilities that contribute to higher wages, so training children to use computers would not necessarily cause their earnings potential to improve. This study illustrates the difficulty of determining cause and effect based on correlations. The data do not reveal whether using a computer causes higher earnings, or whether other factors cause workers to use computers and to earn higher wages.
4. The text points out the pitfalls of social experiments: the problem of obtaining a random sample and the problems of extending results beyond the scope of the experiment. Participants in the study had found it to their advantage to be a part of the experiment, which may have resulted in a self-selected population unrepresentative of the wider group of health care consumers. In addition, the RAND Health Insurance Experiment was of limited duration, after which the participants would move to some other health plan. This

design could induce certain behavior in the short-run that would not necessarily be present if the health insurance coverage were permanent rather than transitory. Further, physicians' "standard practices" are largely determined by the circumstances of the population as a whole, not the relatively small experimental group.

5. The scenario set up by the change in unemployment lends itself to a difference in difference approach, in which the first difference is across time and the second difference is across income level. The researcher would measure the change in unemployment duration for high earners between the period of lower benefits and the period of higher benefits, and then compare this change to the change for the low earners. The treatment group would be the high earners and the control group would be the low earners. The assumption that must hold for unbiased estimates is that in the absence of the policy change, both the treatment and control groups would have experienced the same change in unemployment duration across the periods preceding and following the policy change.
6. Since only five states reduced income taxes, we could examine what happened in a control group of states (those with an income tax but with no change in the tax rates) and compare savings rates between the two. This is important because other factors affect savings rates, but if other factors affected both the control group and the treatment group, then we can conclude that the treatment (lower taxes) caused the change in savings. If, for example, the saving rate for the five states with lower taxes (the treatment group) increased by two percent, while the savings rate for the other states (the control group) increased by one percent, then we could conclude that lower taxes caused the saving rate to increase by one percent—the difference between the two percent increase in the treatment group and the one percent increase in the control group. The assumption that must hold for this difference in difference approach to be valid is that in the absence of the income tax cut, the savings rates of the treatment rates would have increased by the same percentage as the savings rates of the control states.
7. Correlation does not, in general, reveal anything about causation. Spitzer is assuming that because there is no correlation between higher marginal tax rates and slowing economic activity in the data, that marginal tax rates can be raised without harming economic growth. The assumption ignores that other factors could be playing in the economy that would mitigate the effect of higher marginal tax rates. Further, current higher marginal tax rates could imply lower future economic growth, which may not be reflected in the data to which he was referring.
8. There is a weak, positive relationship between deficits and interest rates, implying that larger deficits lead to *lower* interest rates. Inferences based on these data along would be problematic because there are only a few data points and because it would be more informative to look at deficits relative to some benchmark, such as GDP, and to express both interest rates and deficits in real terms, rather than nominal terms. It would also be useful to control for other factors that can affect interest rates, such as monetary policy and the level of economic activity. Most importantly, the correlation found here does not necessarily indicate a causal relationship.