

ECO220Y: Homework, Lecture 5 - SOLUTIONS

(1)

(a) These would be observational data. Both the x-variable (also referred to as the independent variable or the explanatory variable) and the y-variable (also referred to as the dependent variable) are endogenous. Both are affected by other factors (unobserved or lurking variables) because the Bank of Canada sets the interest rate in response to everything it knows about the direction of the economy and many of these factors obviously affect the growth rate of GDP. The Bank of Canada does not randomly set the x-variable (interest rates) but rather systematically chooses it taking into consideration factors that also affect the y-variable (growth rate of GDP). It would be highly unethical for the Bank of Canada to try to collect experimental data by randomly setting the interest rate and seeing what happens to the growth rate of GDP even if such data would be much better able to establish the causal link.

(b) These would be experimental data. Ethics with respect to animals are currently far more lax than with human subjects. Researcher would randomly assign mice to be fed certain diets and then they watch what happens to them. These experimental data are highly informative because significant differences in outcomes can be attributed to the different diets: in other words we can infer causality. The differences in diets are entirely random and hence cannot be influence by unobserved variables like the individual traits of the mice. However there is a price to pay for these informative data: the wellbeing of some mice, those given no choice but to consume an inferior diet, is sacrificed. In contrast, observational data would allow the mice to select their own diets (we would simply observe what they choose) and their individual characteristics, such as propensity to exercise, may affect their choice of diet and their health. While collecting these observational data would allow the mice free choice, we would not be able infer causality from any association we observe between diet and health.

(c) These would be observational data. Firms set (choose) prices taking into account the market demand conditions that also affect the quantities that they sell. Everything that affects demand (demand shifters) would affect both price and quantity (which are the unobserved variables in the terminology of Lecture 5). This is the classic economic example of observational data. It is also the central problem in empirical economics: how do we measure the responsiveness of quantity demanded to a change in price? Unfortunately because only observational data are available--we've yet to see many firms randomly set their prices--we cannot easily measure the causal relationship that is very much of interest. More advanced courses in econometrics would develop sophisticated methods to try to extract a measure of the causal relationship between quantity demanded and price from observational data. This is not easy. We must continually be on guard for endogeneity bias.