Lab 15

The Effects of Changing the Minimum Wage

Introduction

Many people advocate raising the minimum wage as a means of raising the standard of living of many of the poor. (The term "minimum wage" refers to a government-mandated minimum salary that must be paid to all workers.) For example, in 1992 New Jersey raised its minimum wage from $4.25 per hour to $5.05, which means about $128 more per month. However, raising the minimum wage has other effects on the economy, some of which might work against the very people the raise was meant to help. For example, conventional economic theory states that in a perfectly competitive market, employers will cut their work force in response to any rise in the minimum wage. The reasoning is that the increased wages costs the employers money, but does not bring any more money into the business. And so they must fire workers to maintain their profits.

This sounds logical, but that doesn't mean it's true. Some studies done in the 1970s confirmed this theory, but earlier studies, as well as, more recent studies concluded that employment was unaffected by increases in the minimum wage. The data you will examine today come from a study that attempted to clarify the issue.

We will examine the question: are the increased costs of the higher minimum wage passed on to the consumer? (If the costs of doing business increase, rather than lay off employees an employer might raise prices.)

About the Data

The New Jersey minimum wage increase of April 1, 1992, which raised the minimum wage from $4.25 to $5.05, provided a perfect opportunity for some UCLA economists to study this question. The study focused on the fast-food industry for a number of reasons. First, this industry employs predominantly low wage workers. Also, the absence of tips simplifies the measurement of wages. Finally, fast-food restaurants are relatively easy to sample.

The data you are about to examine consists of a random sample of Burger King, Wendy's, KFC, and Roy Rogers restaurants in New Jersey and eastern Pennsylvania. The restaurants were interviewed about one month before and about eight months after the minimum wage increase went into effect. Information was collected at each restaurant about variables such as the number of employees, various product prices, and store hours. This data provided everything necessary to calculate the impact that the minimum wage increase made not only on employment rates, but also on food prices, which can always be raised to compensate for higher wages. Finally, since unemployment is affected by factors other than the minimum wage, the study made careful use of controls. The data from the restaurants in Pennsylvania, as well as data on a number of restaurants in New Jersey that had been using the new five dollar minimum wage as a base salary even before the official increase went into effect, provide logical comparisons for the questions we're studying.

Today's lab

In class today you'll learn some *Stata* techniques as you answer the question given above: Does increasing the minimum wage lead to an increase in costs?

Begin by loading the data into *Stata*.

```
. use http://www.stat.ucla.edu/labs/datasets/fastfoodttest.dta
```

In your variables window you should have a list of 21 variables. To get a better idea of what information is contained in the data set and what all of these variables mean, we use the describe command.

```
. describe
```

Make sure that your results window reports 410 observations with 21 variables. Read over the labels for each of the variables.

Question 1: What does a value of 1 for the state variable represent?

Using the **histogram** command and the **summarize** command, answer the following question.

Question 2: What is the typical cost of an order of small french fries before the minimum wage increase?

We can compare the cost of fries in the two states in a number of ways. One useful method is to make side-by-side boxplots:

```
. graph box pfry, by(state)
```

We can also create side-by-side histograms.

```
. histogram pfry, by(state)
```

Question 3: Before the change in minimum wage, did the costs of a small fry differ between New Jersey and Pennsylvania? If so, which state cost more?

Another method for comparing the two groups is the **summarize** command.

```
. sort state
```

```
. by state: summarize pfry
```

Question 4: What's the typical cost of a small fry after the minimum wage increase? Is it different for the two states?

Question 5: On average, how much did the cost of a small fry change in New Jersey after the minimum wage change?

Suppose we wanted to know which restaurants changed the cost of a small fry the most? Or whether all restaurants changed costs pretty much the same. How could we answer questions like these?

Since we're most interested in how things changed between the first and second interviews, we need to create a new variable that contains the change in cost for each restaurant. To create this difference variable, we use the generate command.

```
. generate diffry = pfry2 - pfry
```

After typing this command you will get a green message informing you that there were 44 missing values generated. This is from missing data in the pfry and pfry2 variables. In general, missing data can cause quite a few problems. For the sake of this lesson, we'll ignore this complicating feature.

Stata tip: instead of typing out the entire **generate** command, you can use **gen** for short and it will still work.

Add a descriptive label to your plot using the label command.

```
. label var diffry "insert whatever label you want here"
```

Question 6: What is the average increase in the price of a small order of fries?

Question 7: Approximately what percent of restaurants raised the price of a small fry?

Question 8: Use side-by-side box plots and side-by-side histograms to examine the diffry variable for each state. What does the economic theory say these graphs should look like? What do these graphs say about the economic theory?

Question 9: Is the mean price change for small fries different in New Jersey than Pennsylvania? By how much? What does this tell us about the theory?

We are not examining all of the restaurants in New Jersey. This is just a random sample. How can we know whether our results about these 295 or so restaurants applies to all restaurants in New Jersey?

If the data were collected in accordance with the assumptions that support a t-test, then a t-test can be used to determine whether the observed difference between New Jersey and Pennsylvania is "real" (which means that we'd see a difference of approximately the same size if we looked at **all** restaurants) or is it just a fluke of the random sampling. If it's just a fluke, then someone else who took a new random sample might reach a different conclusion.

We won't review the assumptions behind the t-test here, but suffice it to say that an important one is that the data are a random sample from the population of all restaurants. As researchers, we would have to design our study very carefully to make sure that this was the case. As consumers of this study, we would have to read the published results carefully to make sure that the design of the study was correct.

In *Stata*, a t-test is run using the **ttest** command. There are several options within this command. To get a good idea of what situations the ttest command can be used in, see the help menu.

```
. help ttest
```

Question 10: To use statistical jargon, we want to determine if there is a statistically significant difference between the mean price change in an order of small fries in New Jersey and Pennsylvania. Based on your answers to questions above, do you think there will be a statistically significant difference? Why?

Here, the form of t-test that is applicable is:

```
. ttest diffry, by(state) unequal
```

The "unequal" option tells *Stata* that we are **not** assuming that the population variance of price changes in New Jersey restaurants is the same as the population variance of price changes in Pennsylvania restaurants.

Question 11: What assumptions are we making by running this t-test? Are those assumptions reasonable with this data? Explain.

Question 12: Is this an example of a one or two tailed test? What are our null and alternative hypotheses? What is the test statistic generated by Stata for our test? What is the corresponding p-value? State the conclusion of the test.

If we had reason to believe that the variances of price changes in the two states *were* equal, then we could have omitted the "unequal" command. However, it is now common practice to **always** use the "unequal" option unless you know for a fact that the population variances are the same. There are several reasons for this. One is that in general we want to make as few assumptions as possible. After all, if our assumptions are wrong, then our results can be challenged. So why assume equal variances if we don't have to? As a practical matter, it is easy to do the test twice, once with and once without the assumption. If your conclusions differ, then you may have to examine the

data more closely to see if you can commit to the equal variance assumption. But if your conclusions don't change, then the assumption is not important.

Question 13: Repeat the test without the "unequal" option. Does it affect your conclusion?

Assignment

Did the increase in minimum wage lead to a decrease in employment? Use whichever methods you want to support your answer. Your answer should include the graphs or summary statistics you think appropriate. Your report should also include answers to these questions:

Which response variables did you examine and why? Do your conclusions change if you use a different response variable? If so, can you explain why?

Some of the restaurants in New Jersey were already at the higher minimum wage level at the first interview. How does their inclusion in your statistics affect your conclusions?

Going a little further

Missing data can affect results. Suppose that restaurants that paid lower-than-average wages (but still at or above the minimum wage) were less likely to respond to either survey. (Maybe because they didn't want it known that they paid so little.) How would this affect your conclusions? Suppose instead that surveys are missing for a variety of "random" reasons unrelated to issues of profits or costs or wages. How would this affect your conclusions? How would you examine these data to see if the missing data might affect your conclusions?