Eric Doviak

Introduction to Economic and Business Statistics

Homework #4

This assignment spans our discussions of sampling distributions, parameter estimation and hypothesis testing. It also provides background on the award of the 2011 Nobel Prize in Economics to Christopher Sims[*] for his work on Vector AutoRegression (VAR) models. VAR modelling is based on ordinary least squares (OLS), which will discuss later in the course. Time-permitting, we may also discuss VAR modelling at the end of the semester.

Some of the material that I am assigning is rather advanced. Don't worry about the mathematical details. If you focus on the concepts, the math will make sense.

Chapter 7 of the Schmidt textbook has a discussion of estimating the average height of English women from a sample and then computing the standard error of the estimate. Its intuitively clear that drawing a different sample of English women will give you a different estimate of the average height. It also intuitively clear that the standard error of your estimate will shrink as the sample size grows larger.

But that discussion is dry, abstract and – quite frankly – boring. So I want you to see how this is useful in practice. To that end, please read:

1. the paper that Sean MacDonald and I wrote on "Terraced VARs"
2. the most recent update of our New York State labor market forecasts
3. Mark Thoma's description of Sims' work

Links to each of those files are available on the course website:
> http://www.doviak.net/courses/statistics/

The labor market forecasts provide you with the forecast as well as a 90 percent confidence interval. This should give you a quick visual understanding of what a confidence interval is. Our paper on "Terraced VARs" explains our motivation and provides an intuitive explanation of our work. Finally, Mark Thoma explains what VARs are and how Sims' work contributed to our understanding of macroeconomics.

Please come to class prepared to answer the following questions:

1. Our labor market model predicts that the US unemployment rate will decrease from 8.3 percent in January 2012 to 7.7 percent in January 2013, the 90 percent confidence interval of that estimate ranges from 5.2 percent to 10.2 percent.

    a. Why is it important to provide the confidence interval? Why is it not sufficient to simply state the value of the forecast?

    b. The confidence interval around our January 2013 forecast is very wide (5.0 percentage points), but note that the confidence interval only ranges from 7.0 percent to 9.0 percent for the June 2012 forecast. Why does the confidence interval grow wider as we project further out in time?

    c. Does the inclusion of the 90 percent confidence interval make our estimates more or less credible?

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[*] Sims shared the Nobel with Thomas J. Sargent.

2. Below is a copy of the Hurricane Irene tracking map from the *New York Times*. Notice that it also contains a band around its forecast of the projected path of the storm. What similarities do you notice between the confidence interval around our labor market forecasts and the confidence interval around the storm's projected path?
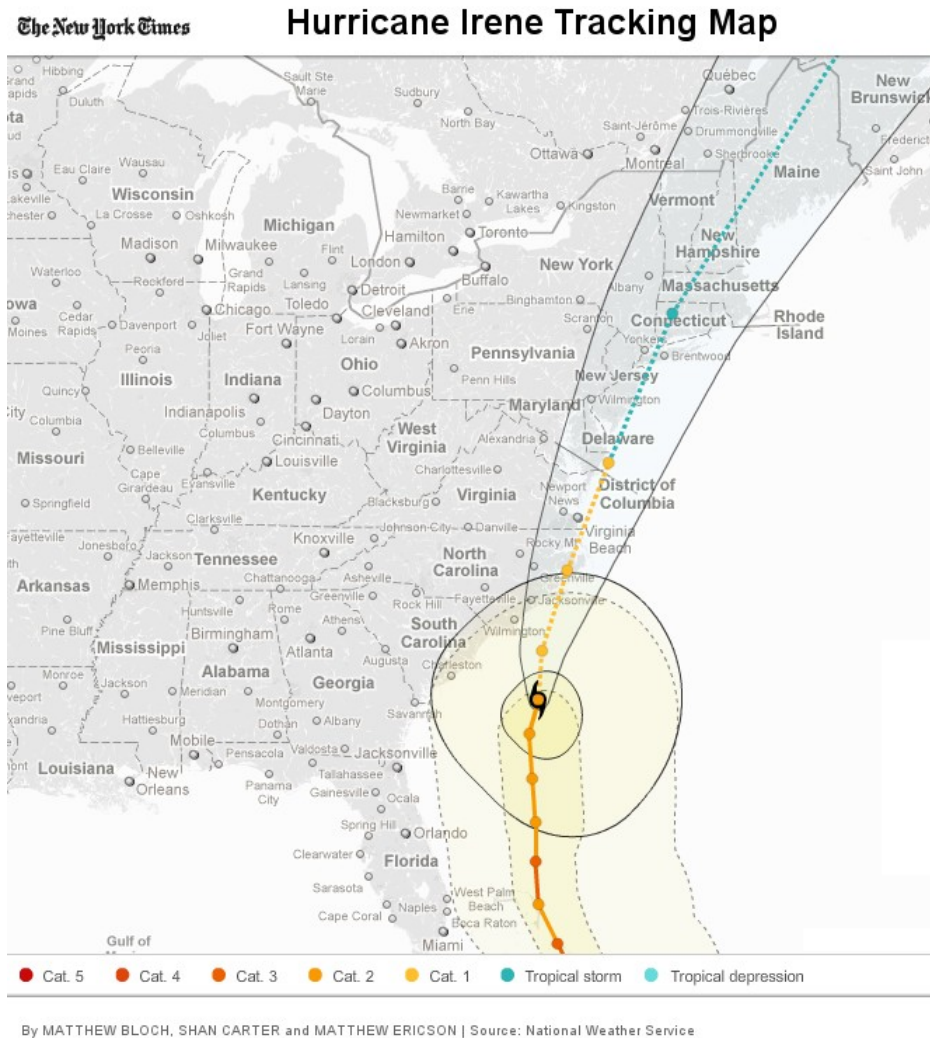
3. In our paper, Sean and I state that our forecast error does not account for sampling error and we state our reasons for omitting it. What is sampling error? How does sampling error affect the values of our forecasts?

4. How does sampling error relate to the standard error of an estimate? Why does the standard error go to zero as the number of observations increases?

5. In his discussion of Sims' work, Thoma explains that Sims' VAR methodology is an attempt to overcome the problems associated with exclusion restrictions that plagued previous work. By contrast, the Terraced VARs that Sean and I developed are full of exclusion restrictions.

   a. What is an exclusion restriction? What are the problems associated with exclusion restrictions?

   b. What was the purpose of Sims' work? What was the purpose of Sean and my work?

   c. Given the purpose of Sean and my work, why don't exclusion restrictions pose a problem?