Economics 468

October 5, 2016 **R. Davidson**

Assignment 2

1. Generate a figure like Figure 2.15 in the textbook for yourself. Begin by drawing 100 observations of a regressor x_t from the $\mathrm{N}(0, 1)$ distribution. Then compute and save the h_t for a regression of any regressand on a constant and x_t. Plot the points (x_t, h_t), and you should obtain a graph similar to the one in Figure 2.15.

Now add one more observation, x_{101}. Start with $x_{101} = \bar{x}$, the average value of the x_t, and then increase x_{101} progressively until $x_{101} = \bar{x} + 20$. For each value of x_{101}, compute the leverage measure h_{101}. How does h_{101} change as x_{101} gets larger? Why is this in accord with the result that $h_t = 1$ if the regressors include the dummy variable $\boldsymbol{e}_t$?

2. Consider once more the data you found for the last assignment. The model you were asked to estimate is clearly grossly misspecified. See if you can come up with a better model for the consumption function, trying specifications both in levels and in logs, and trying various dynamic models, with lags of both dependent and independent variables.

3. Connect to the site of the St Louis Fed:

http://fred.stlouisfed.org,

and seek the following series for the US: the interest rate on 90-day treasury bills, (the identifier is `TB3MS`) p_t, the price index for personal consumption expenditures (`PCECTPI`), and dy_t, the quarterly percentage change in seasonally adjusted real GDP at annual rates (`A191RL1Q225SBEA`). The last two series begin in 1947, but for one the first quarter of the year is missing. All have data up to the present, by which I mean the second quarter of 2016. From the price index series, the rate of inflation, π_t, can be calculated. Since the interest rate data are monthly, while the other series are quarterly, form a quarterly series, r_t, by averaging the rates over the three months of each quarter. For the period 1948:1 to 2015:4, run the regression

$$\Delta r_t = \beta_1 + \beta_2 dy_t + \beta_3 dy_{t-1} + \beta_4 \pi_t + \beta_5 r_{t-1} + u_t,$$

where Δ is the **first-difference operator**, defined so that $\Delta x_t = x_t - x_{t-1}$. Plot the residuals and fitted values against time. Then regress the residuals on the fitted values and on a constant. What do you learn from this second regression? Now regress the fitted values on the residuals and on a constant. What do you learn from this third regression?