Economics 312 Spring 2014

Project #2 Assignment Due: Midnight, Monday, February 17

Partner assignments

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If you haven't yet done so, look at the project guide and sample report on the class Web site to get an idea of how your team should approach working together and what is expected in your report.

This project uses a subset of a data set that accompanies Stock and Watson's popular econometrics textbook. A link to the data set is on the assignment page or you can download it from academic.reed.edu/economics/parker/s14/312/asgns/datasets/Evals.dta.

The data are taken from the following paper, to which the authors apply an amiable (Amy-able?) and appealingly alliterative appellation:

Daniel Hamermesh and Amy Parker, "Beauty in the Classroom: Instructors' Pulchritude and Putative Pedagogical Productivity," *Economics of Education Review*, 24(4), August 2005, 369–76.

(You are not expected to read this paper for this assignment; in fact, it's probably better if you don't because reading it may bias how you would approach or interpret the questions in the assignment. The reference is included to give appropriate credit and in case you are interested in the topic.)

The table below describes the variables in the data set:

Variable	Definition
eval	"Course overall" teaching evaluation score, on a scale of 1 (very unsatisfactory) to 5 (excellent)
beauty	Rating of instructor physical appearance by a panel of six students, averaged across the six panelists, shifted to have mean zero.
age	Instructor's age
female	= 1 if instructor is female, 0 otherwise

1. Data and summary statistics

a. Examine the data using the data browser. Do there seem to be multiple observations from the same instructor? How might this violate the OLS "SR" assumptions? Based on casual examination of the data, speculate on how large a problem this may be for this dataset.

b. Compute and present the summary statistics for all four variables. The *female* variable is what we call a "dummy" (or indicator or binary) variable. How can we interpret the mean of this variable? The table above says that the *beauty* variable is "shifted to have mean zero." What does this mean (no pun intended … for once)? It this verified by your table? What else, if anything, is notable about the summary statistics?

2. Simple regression. Perform a simple regression of course evaluations on beauty and use the results to answer the following questions:

a. What is the interpretation of the intercept term in the regression? What is the interpretation of the slope coefficient? If Professor Average has average beauty, what is our best prediction of her evaluation score? If Professor Gorgeous has a beauty score two standard deviations above the mean, what is our prediction of his score? If Professor Ugly has a beauty score two standard deviations below the mean and gets evaluations of 3.9, would you consider him to be a good or bad teacher apart from his appearance? Why?

b. If we increase the value of *beauty* by one standard deviation (of *beauty*), by how many standard deviations (of *eval*) does the expected value of *eval* go up along our regression line? (This measure is commonly used in non-economics social sciences and is often misleadingly called a "beta" coefficient.) What is the advantage of this measure compared to the simple regression slope coefficient?

c. Assess the strength of your regression relationship using (1) the *R*-square statistic and (2) the standard error of the estimate (reported in Stata as the "root mean squared error" or RMSE) in comparison to the standard deviation of the dependent variable. Retrieve the fitted (predicted) values and residuals from this regression. What is the range of your fitted values compared to the actual values of *eval*? Is this a problem? Examine the residual series to see if there are any obvious outliers. Create a graph with both the actual values of the dependent variable and the fitted values (measured on the vertical axis) plotted against the regressor (*beauty*) on the horizontal axis. Based on your graph, does the linear functional form seem appropriate? Graph the residuals on the vertical axis against the regressor on the horizontal. Is there evidence of heteroskedasticity in that the variance of the error may be related to the magnitude of the regressor? (These plots can be done using the standard Stata graphics commands, or the automated commands avplot and rvpplot can be used.)

d. Using this regression, can we reject the null hypothesis that beauty has no effect on evaluations at the 5% level of significance? Professor Cat (a perpetual member of the Committee on Advancement and Tenure) has defended the use of evaluations by asserting that the effect of a one-standard-deviation change in beauty could not possibly be larger than 0.05. Can we reject Professor Cat's (one-tailed, pun intended this time) hypothesis?

3. Sub-sample regressions. Some have argued that our society seems to place more emphasis on women's appearance than on men's. Perform separate regressions for the sub-samples of female and male professors. Interpret the results. Do they support the supposition that appearance is more important for women's evaluations? (We will soon learn how to perform a statistical test of this hypothesis; it can't be done from separate regressions.)

4. Effects of age. Another frequent presumption is that young people are generally considered to be more beautiful than older people. Is this true in this sample? Calculate and interpret the correlation coefficient between beauty and age. Suppose that older professors are generally more experienced and because of this tend to be more effective teachers, other things being equal. Explain how omitting age from the regression might bias the estimated effect of beauty on evaluations in this case. Would the bias be upward or downward? (You can try adding age to the regression to see what happens.)

5. Averaging multiple courses by the same instructor. Assume that any observations with the same values for *age*, *female*, and *beauty* are different courses taught by the same instructor. Sort the dataset by these three variables, then use the collapse command to create a new dataset with one observation per instructor and the evaluation variable set to the average evaluation for each instructor across all courses. (Be sure that you don't save this over your original data set!) How many observations are in this dataset? Re-run the *eval* on *beauty* regression and discuss how or whether the results change, and why. Is this what you expected? Which regression do you think is more reliable, and why?