Problem Set 4

This problem set will be graded and is due by 5pm on Friday, February 18th. It may be turned in earlier either in class or to your TA's mailbox in the economics department mailroom. You may work in groups but everyone in the group must write up their own solutions including creating their own graphs and tables.

The Marginal Propensity to Consume

At this point in the course, you have had a fair amount of practice working with data in Excel. Now the problem sets will shift their focus from walking through the steps in Excel to thinking about how to use the tools you now have to analyze economic questions. Consequently, an important part of the problem sets from this point on will be figuring out the best approach to take to answer the question of interest. There will be many correct ways of going about solving these problems (and many incorrect ways). This problem set will help you start making these decisions of how to do analysis on your own rather than simply following steps given to you. It will be up to you to decide when a variable should be transformed, when a new variable needs to be created, when observations should be dropped, and so on.

(a) The goal of this problem is to gain some insight into the marginal propensity to consume (MPC). The MPC is a concept economists use to describe how much of each additional dollar in income goes toward consumption. So if the value of a consumer's MPC is 0.4, when the consumer gets an extra dollar in income she will spend 40 cents of it and save the remaining 60 cents. Given this definition of the MPC, write down an equation that gives money spent on consumption goods as a function of income and the MPC. (Note that the MPC will rarely tell us exactly how much a person consumes given their income. Consumption will often times be a little higher or a little lower for many reasons other than just differences in income. Your equation should account for this additional variation in consumption with an error term.)

(b) Consumers have to spend a certain amount of money even if they have no income. They still need to pay for necessities like rent and food. Let's assume that this is a fixed amount of spending and that all additional spending as income starts to go up from zero is determined by the MPC. Write down an equation that gives money spent on consumption goods as a function of income, the MPC and the fixed amount of spending on basic necessities (we'll call it autonomous consumption, C_a).

(c) We are going to use data from the *Economic Report of the President* to try and learn about the marginal propensity to consume. The following website contains down-loadable versions of various statistical tables from the 2010 *Economic Report of the President*:

http://www.gpoaccess.gov/eop/tables10.html

Suppose we wanted to get an estimate of the MPC for the United States. What would your ideal data look like?

(d) Look through the data available from the *Economic Report of the President*. Most likely, your ideal data is not there. Determine which available data series would be best for estimating the MPC. How do these data differ from your ideal data? What implications does this have about how your estimate of the MPC may differ from the true value (or the value you would estimate with your ideal data)?

(e) Choose the best data to estimate the MPC, download the data and combine it into a single Excel spreadsheet so that you can analyze it. Use your data to estimate the MPC assuming that autonomous consumption is zero (note that one of the regression options in Excel is 'Constant is zero'.) Based on your results, calculate a 90% confidence interval for the MPC.

(f) Drop the assumption that autonomous consumption is zero. Use your data to get esti-mates of both autonomous consumption and the MPC. Give a 90% confidence interval for each of these estimates.

(g) Use the results of your regression and a scatterplot of your data to argue whether the assumption in part (e) that the autonomous consumption is zero seems reasonable.

(h) Create a scatterplot of the residuals from your regression in part (f). The residuals $(y_i - \hat{y}_i)$ should be measured on the y-axis and the value of income should be measured on the x-axis. Given this scatterplot, does it appear that any of the assumptions we made about the error terms are violated? (These assumptions are listed on page 109 of your textbook.)

(i) Use your data to test the claim that people save more than 50% of each dollar they earn.