

## Consumption Function Assignment

This assignment builds on the work we did on Keynes's consumption function in class. Recall we found that the function estimated on postwar US data had a statistically significant negative intercept, which went against Keynes's expectations. In the following exercise we explore this issue further.

You should prepare a report which includes the various graphs and statistical output called for below, along with your commentary. In the spirit of Tufte, pay attention to the issue of clear presentation.

### 1 The role of wealth

In chapter 8 of the *General Theory*, Keynes points out that factors other than current income can have some importance in determining the level of consumer spending. Perhaps the apparent negative intercept is really telling us that some other variable is missing from the function we estimated? Specifically, perhaps the level of wealth, in the form of shares of stock, is missing from our previous treatment.

We'll add a measure of wealth to our dataset (if you haven't already done so).

1. Start gretl and re-open the dataset you constructed in class (containing consumption and income data).
2. Revisit the fedstl database and grab the series `cpiaucsl` (the CPI).
3. Visit the `sp` database. We're looking for a measure of stock market wealth. The variable `sp04` is suitable. Import this series.
4. Deflate the value of the stock market using the CPI. From the **Variable** menu select **Define new variable**. Define the new variable as follows:

$$\text{wealth} = \text{sp04} / (\text{cpiaucsl}/100)$$

5. Save the augmented dataset (**File, Save data**).
6. Recall that our "puzzle" concerned the average propensity to consume, or APC, defined as the ratio of consumption to disposable income. Create a new variable representing the APC. Using **Define new variable**:

$$\text{APC} = \text{pcec96} / \text{dspic96}$$

7. Make a time-series plot of the APC, and comment on what you see.

8. We'd like to see whether the level of the stock market may be "driving" the APC (people feeling able to spend a larger fraction of their income when stocks are high). Create an X-Y scatter plot, with **wealth** on the X axis and **APC** on the Y. To get another view, also create a time-series plot of both variables together. Comment on what you see. Next step: we estimated a model with consumption as the dependent variable and disposable income as the independent variable. We're now suggesting that there might be (at least) one other relevant independent variable. One way of examining this point is to run a *multiple regression*, including both income and our measure of wealth of the right-hand side.

In gretl, select Model, Ordinary Least Squares. Select **pcec96** as the dependent variable, **dspic96** and **wealth** as the independent variables. Estimate the model. Comment on the results: Does it appear that disposable income and wealth are both significant factors governing consumption?

At this point it would be good to know: what does our model imply about the behavior of the APC as income rises, *for a given level of stock market wealth*. You can simulate this using Excel.

1. Open Excel. In a new worksheet, enter the coefficient values from the multiple regression you just ran.
2. Below the coefficient cells, enter 4 column headings: "income," "wealth," "consumption" and "APC."
3. Type in 7000 for the first value under the "income" heading, and 6 for the first wealth value.
4. In the first cell under the consumption heading, enter a formula. This should be the regression formula from the model estimated in gretl. It will have the general form:

$$= b0 + b1*income + b2*wealth$$

However, you should replace income and wealth by references to the cells containing these values (you can put a reference into the formula by clicking on the relevant cell). You should also replace b0, b1 and b2 by references to the cells containing the coefficients. In the case of the coefficients, you'll need to "fix" the references by putting dollar signs into the formula. For example, if b0, the estimated constant from the regression, has been entered into cell A1 of the worksheet, the reference that goes into the formula should be **\$A\$1**.

5. Also create a formula for the APC. This one is easy.
6. Now go into the second cell below the "income" heading, and give it a formula, namely the previous value (click cell above) plus 250. Pull this formula down the income column so that you have values from 7000 to 9000 in steps of 250.

7. Go into the second cell below the “wealth” heading and give it the simple formula, = the previous value (click the cell above).

8. Drag all the formulas down their respective columns, to match the 7000 to 9000 range of income. You now have a simulation of what will happen to consumption, and the APC, if income rises in the range 7000 to 9000 while the stock market stays steady at 6. Comment on your findings.

## **2 The consumption function over time**

Another possible response to the “puzzle” with which we started this exercise is that the consumption function has not necessarily “stayed put” over time. Perhaps it has “drifted” as income rose over the decades? To investigate this possibility, try estimating the simple consumption function (with income as the only independent variable) on some sub-samples of the data period.

1. Set the sample range to start in 1959:01 and end in 1969:12. You do this under the Sample menu, Set range option. Estimate the simple consumption function over this period. Comment on the results.

2. Repeat the exercise for the following sample ranges: 1970:01 to 1979:12, 1980:01 to 1989:12, 1990:01 to 1999:12, and 2000:01 up to the end up the data. Comment on the results in each case. Any ideas, based on all the information you’ve gathered, about what might be happening in 1990s?