Problem Set 7

Destan Kirimhan
University of South Carolina
Finance Department

I would like to understand the relationship between income and consumption in USA. For this reason, I went to Bureau of Economic Analysis (BEA) website and gathered the data for Gross Domestic Product in terms of chained dollars as a real GDP (income) measure and also for personal consumption expenditures (PCE) in current dollars as a nominal consumption measure. Then, I combined the ddf5 dataset containing real GDP with df5 dataset containing nominal PCE with each other under the name of merge1. However, I need to put PCE in real terms. Therefore, I went to the website again to collect Fisher Price Index as a consumer price index (CPI) measure. I saved this dataset with the name of dfdf5. I divided the personal consumption expenditures in current dollars to the Fisher index in order to get the personal consumption expenditure in real terms. Finally, I merged these two datasets (merge1 dataset which contains real income; and dfdf5 which contains real PCE) as merge2 dataset. In the final step, I showed the scatter plot between real PCE and real income where the slope of the linear regression line shows the marginal propensity to consume and the intercept shows the autonomous consumption which does not depend on income. However, it is important to note here that these results should be interpreted with cautious since real income measure used in this analysis is not the personal disposable income which is calculated after taxes and added the transfers. Yet, results are still crucial to understand how income distribution across time (not population) and the what the magnitude of the marginal propensity to consume is. The dataset covers years from 1959 to 2016 and it is annual data.

As the first step, I drew a scatter plot between consumption and income, where income is in the x-axis and consumption is in the y-axis in line with the consumption function in the economics books. The axes are in 10 million US Dollar units. Figure 1 shows the relationship between real consumption and real income. There is a positive relationship between consumption and income. The slope which is the marginal propensity (MPC) to consume seems to be much greater than 0.5.

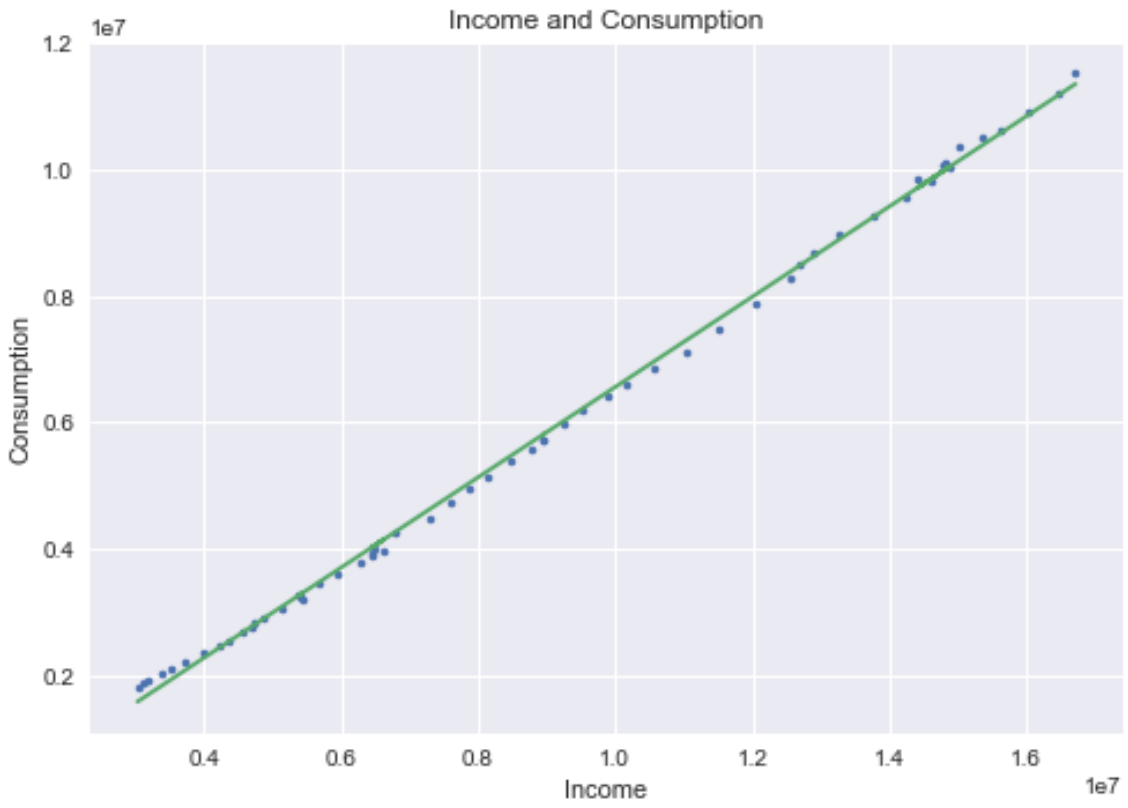

Figure 1: Relationship between Consumption and Income

In order to understand the real value of MPC, I regressed real consumption on real income and get the regression results shown in the following table. We can see that the F-statistics is highly statistically significant. Thus, the model fit the data well. Secondly, both the intercept and the slope coefficients are also statistically significant. Here, the slope is nearly 0.71, which is the MPC. Therefore, as real GDP increases by 1 U.S. Dollars, the real consumption will increase by 71 cents in U.S. As the general understanding reveals, the rest of 29 cents (marginal propensity to save, MPS) is expected to be saved. These measures are important for two main reasons. First, policymakers try to control demand-side inflationary effects of high MPC especially during the boom periods. Second, they may utilize from the MPS measure to forecast the growth of the real economy.

Dep. Variable:	B	**R-squared:**	0.999
Model:	OLS	**Adj. R-squared:**	0.999
Method:	Least Squares	**F-statistic:**	4.371e+04
Date:	Mon, 13 Nov 2017	**Prob (F-statistic):**	1.06e-82
Time:	12:36:43	**Log-Likelihood:**	-754.40
No. Observations:	58	**AIC:**	1513.
Df Residuals:	56	**BIC:**	1517.
Df Model:	1		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	-5.599e+05	3.39e+04	-16.541	0.000	-6.28e+05	-4.92e+05
A	0.7120	0.003	209.068	0.000	0.705	0.719

Omnibus:	3.308	**Durbin-Watson:**	0.225
Prob(Omnibus):	0.191	**Jarque-Bera (JB):**	3.152
Skew:	0.515	**Prob(JB):**	0.207
Kurtosis:	2.508	**Cond. No.**	2.34e+07

Table 1: OLS Regression Results

To better understand the evolution of income across years, I would like to draw the histogram of real GDP as in Figure 2 below. The distribution of income is not normal reflecting the boom and recession periods. It has two peaks where the first one is almost double amount of the second one. Yet, the tails are thin and mean value of real GDP cannot be understood in exact terms by looking only at this histogram graph.

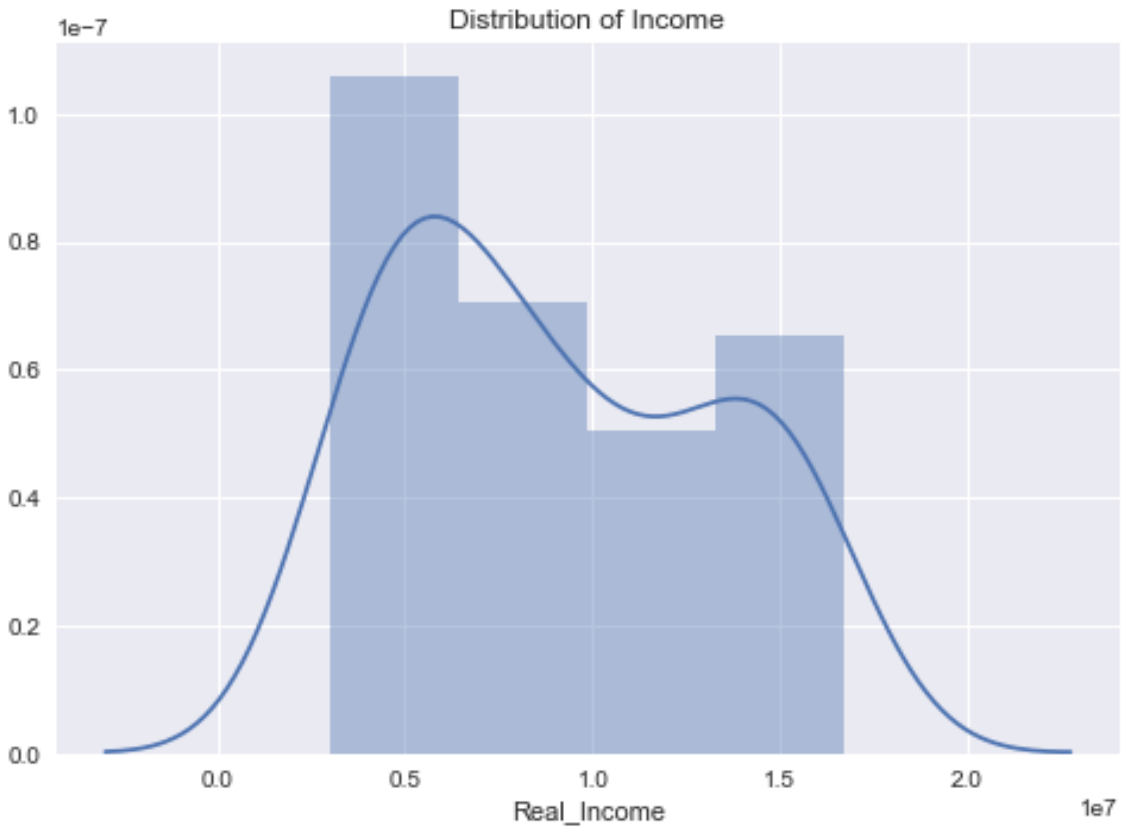

Figure 2: Distribution of Income across Years