

Assignment #4: Review of Statistics and Data Retrieval

1. *Cross Section Data*

Table: Statistics on earnings and education for 21 year-old men and women from PSID (1993)

	<i>Men (n=149)</i>		<i>Women (n=158)</i>	
	Earnings	Education	Earnings	Education
Mean	\$11,280	12.11	\$8,774	12.54
Median	\$9,000	12	\$6,800	12
Standard Deviation	9,531	1.75	7,628	1.84

**Note: Sample includes only individuals who earned income in 1993. One outlier (male) reporting more than \$100,000 in income was excluded from the sample. This affects the hypothesis testing below.

- (b) H_0 : Average women's salary = average men's salary
 H_A : Average women's salary \neq average men's salary

$$t\text{-statistic} = (8774 - 11280) / (7628 / \sqrt{158}) = -4.128 \quad p\text{-value} = 0.0001$$

Since the absolute value of the t-statistic is greater than the critical t-value (i.e., the p-value is less than 0.05), we reject the null hypothesis that women earn the same income as men. This means the income of women in the sample is statistically different from that of men.

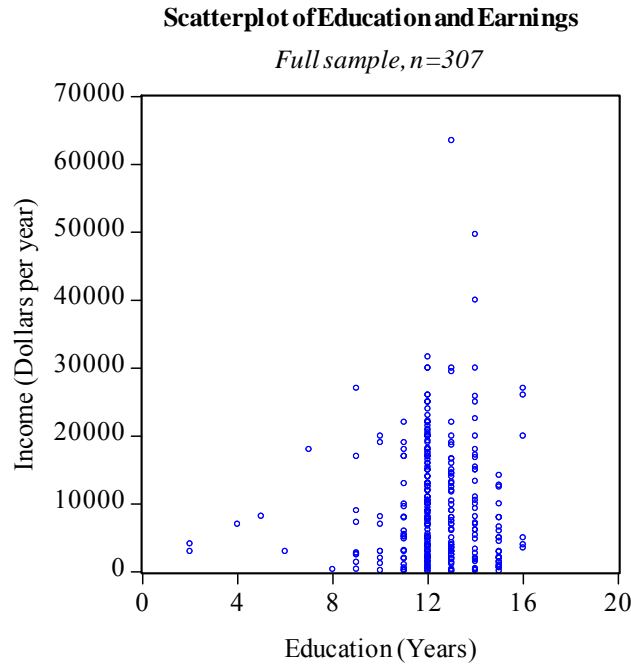
- (c) H_0 : Average women's education = average men's education
 H_A : Average women's education \neq average men's education

$$t\text{-statistic} = 2.92 \quad p\text{-value} = 0.0040$$

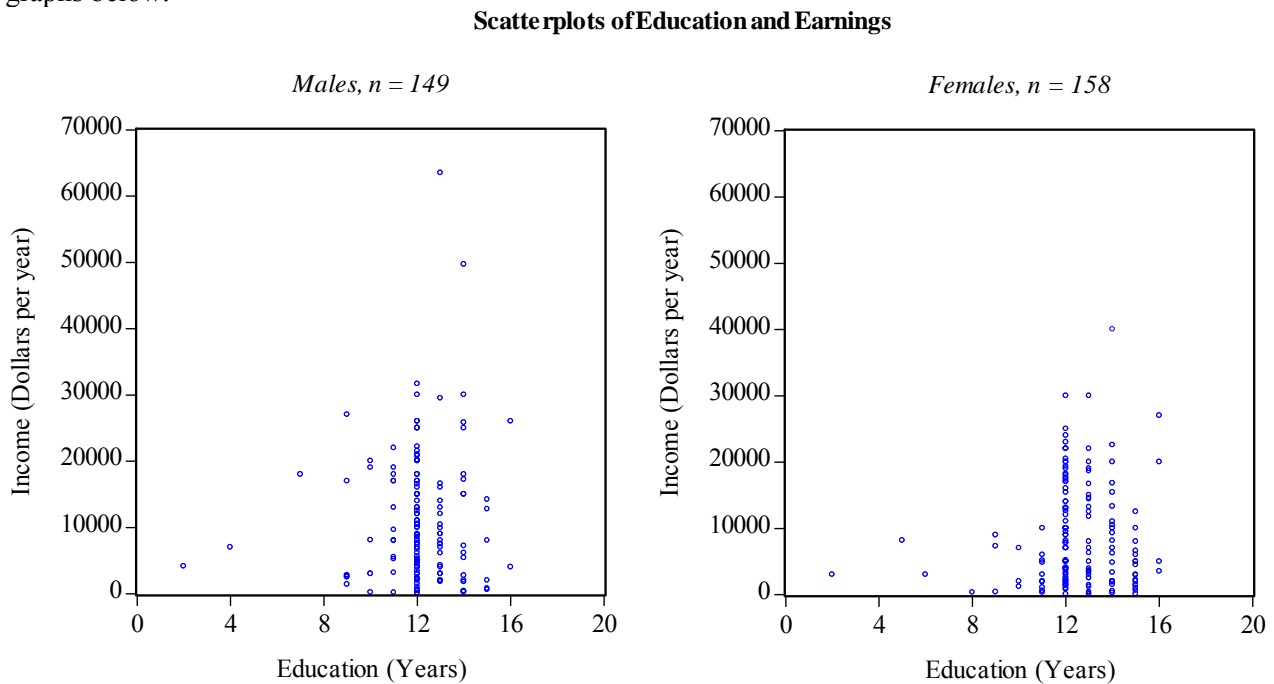
Since the absolute value of the t-statistic is greater than the critical t-value (i.e., the p-value is less than 0.05), we reject the null hypothesis that women have the same education level as men. This means the education level of women in the sample is statistically different from that of men.

- (d) Correlation = 0.0456 > 0. The correlation is positive relatively small. Correlation coefficients are between -1 and 1.

(e) See graph. Note, outlier was excluded from this sample.



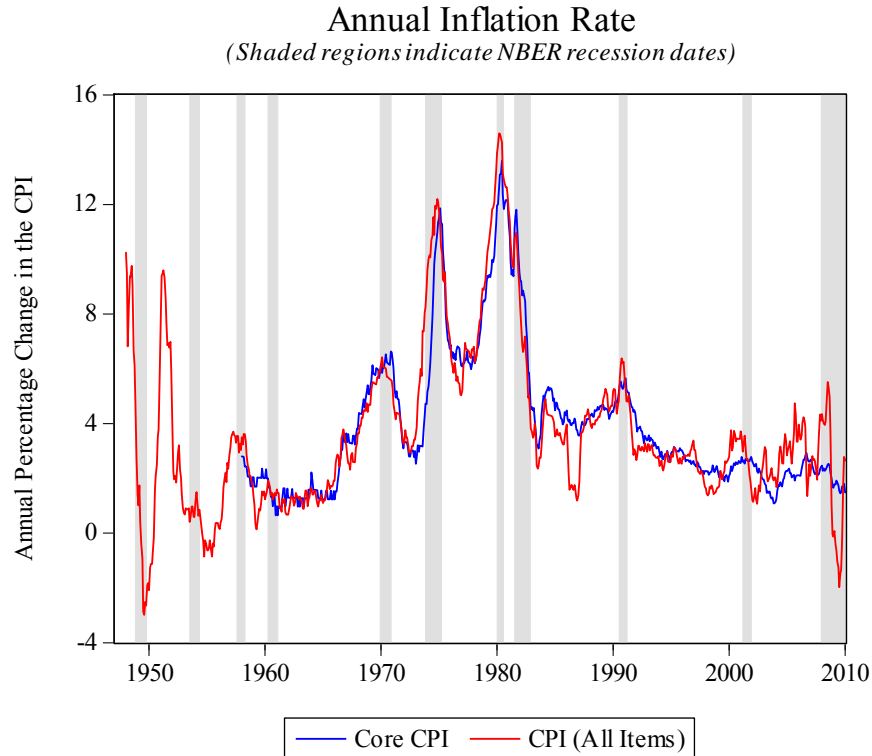
(f) See graphs below.



(g) See above. The earnings of men and women differ in this sample (see hypothesis test above). There are several things that could explain this difference. Variables that may influence earnings include education (although this doesn't seem to be important for the 21-year olds in our sample), work experience, employment/unemployment status, and marital status. For example, if a woman decides to leave the workforce to have a child, or to care for a family member, this could reduce the number of years of work experience, reducing her earnings. This highlights the importance of looking at several variables – a difference in pay between men and women doesn't necessarily indicate that there is discrimination. We have to control for other variables that influence earnings (besides gender and education), if we want to know whether there is discrimination in pay.

2. Time Series Data

(a) See graph.

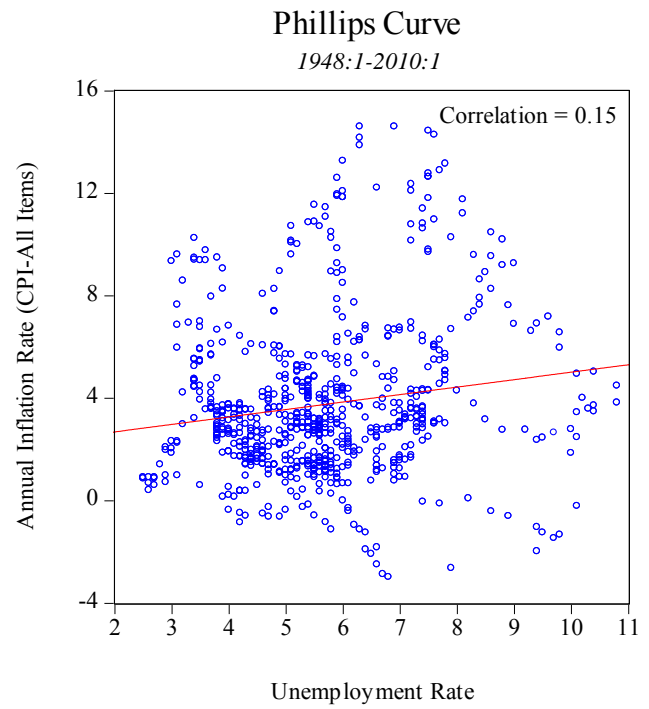
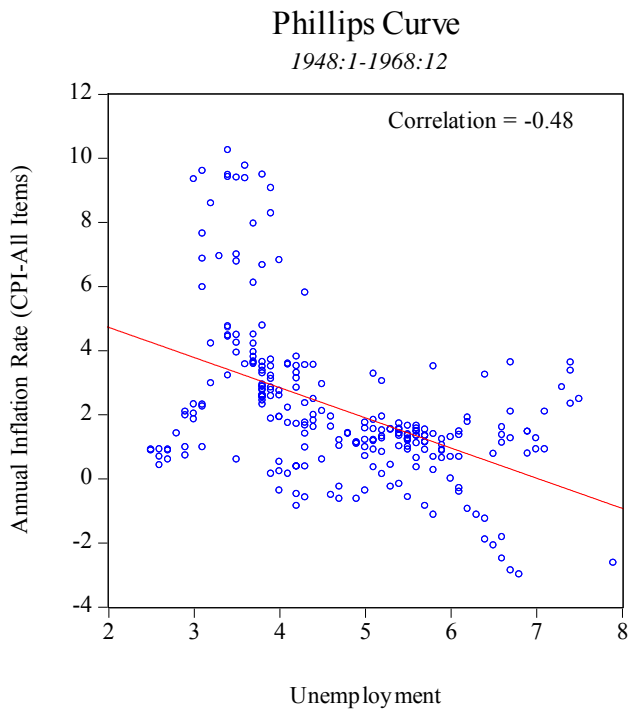


(b) See table below. “Falling/Rising” indicates that the inflation rate fell, then rose during the recession; or that there is some ambiguity depending on which inflation series we use.

Recession Dates	Inflation Rate
November 1948 – October 1949	Falling
July 1953 – May 1954	Falling/Rising
August 1957 – April 1958	Falling
April 1960 – February 1961	Falling
December 1969 – November 1970	Rising/Falling
November 1973 – March 1975	Rising
January 1980 – July 1980	Rising/Falling
July 1981 – November 1982	Falling
July 1990 – March 1991	Rising/Falling
March 2001 – November 2001	Falling
December 2007 –	Falling

Note that during the 1969-1970 recession, the CPI –All Items inflation series rises, but the CPI – All Items less food and energy series is falling. This is important for understanding the explanation of why the Phillips Curve relationship breaks down beginning in the 1970s.

- (c) Correlation = -0.4795; See graph below to the left. The downward sloping Phillips Curve is meant to show the tradeoff faced by policy makers – they cannot reduce inflation without also increasing unemployment. Likewise, if a policy maker wants to reduce unemployment, he/she has to be willing to face higher inflation.



- (d) Correlation = 0.15; See graph above to the right. The Phillips Curve relationship breaks down in the 1970s because of the existence of supply shocks. Specifically, the sudden increase in oil prices lead to an increase in inflation coupled with falling output and rising unemployment. This is why the correlation becomes positive after 1969. In reality, changes in expected inflation cause the Phillips Curve to shift over time. When we look at the simple correlation between inflation and unemployment without accounting for changes in expected inflation and supply-side shocks, we find a positive correlation. As in 1e), this highlights the importance of accounting for other explanatory variables that may affect the behavior of your dependent variable.