Economics 310
Fall 2004
University of Wisconsin-Madison

Menzie D. Chinn
Social Sciences 7418

Problem Set #2

This problem set is due in lecture on **Wednesday, October 13th**. We do not accept late problem sets. **Be sure to show your work** (that is, do not use a spreadsheet or statistical program to generate your answers). Write your name and the name of your Teaching Assistant on your problem set.

Answer all the problems below. They are from the textbook, with the exception of Problem X and Y which are written out.

Bayes Rule
- 3.78

Discrete Random Variables
- 4.14
- 4.24
- 4.28

The Binomial Random Variable
- 4.40
- 4.42
- 4.50
- 4.56

The Poisson Random Variable
- 4.58
- 4.62
- 4.70

Hypergeometric Distribution
- 4.78

The Uniform & Normal Distributions
- 5.8
- 5.18
- 5.28
- 5.30
- 5.34
- 5.40
- 5.100

Problem X. Consider the following monthly data on US employment.

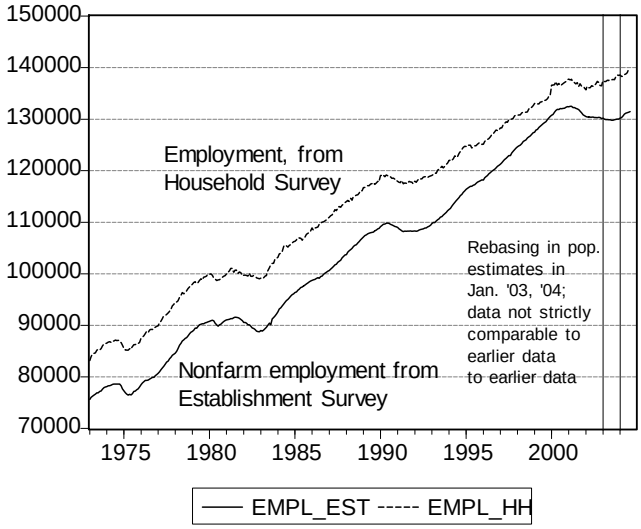

Figure 1: Civilian employment, in thousands, according to the Establishment and Household Surveys, 1973:01-2004:08. Data from BLS, accessed September 30, 2004.

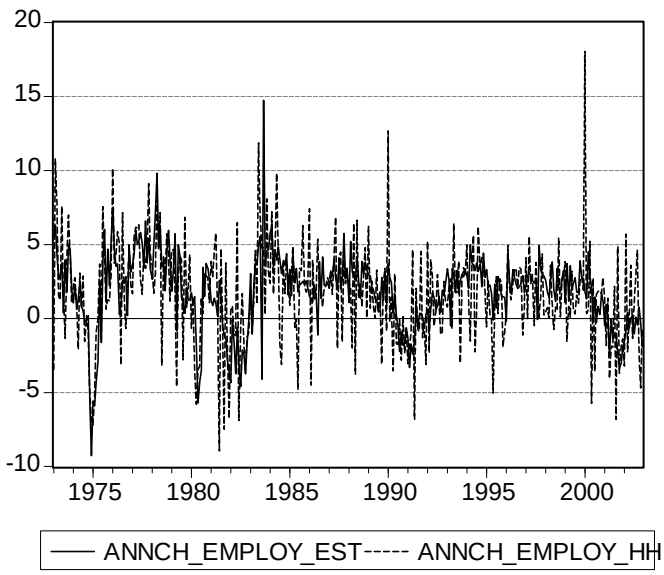

Figure 2: Annualized month-on-month percent change in civilian employment, according to the Establishment and Household Surveys, 1973:01-2002:12.

Tabulation of ANNCH_EMPLOY_EST and ANNCH_EMPLOY_HH
Date: 09/30/04 Time: 16:54
Sample: 1973:01 2002:12
Included observations: 360

Tabulation Summary

Variable	Categories
ANNCH_EMPLOY_EST	2
ANNCH_EMPLOY_HH	2
Product of Categories	4

		ANNCH_EMPLOY_HH		
% Total		[-20, 0)	[0, 20)	Total
ANNCH_EMPLOY_EST	[-20, 0)	13.06	6.39	19.44
	[0, 20)	14.44	66.11	80.56
	Total	27.50	72.50	100.00

An annualized month-on-month percent change in a variable *Z*, is calculated as follows:
$ANNCH\_Z = 1200 \times [\log(Z_t) - \log(Z_{t-1})]$

X.1 What is the probability that the annualized change in establishment employment is positive?

X.2 What is the probability that employment as measured by the establishment survey grows, but employment as measured by the household survey declines?

X.3 What is the probability that the annualized change in the establishment employment is positive, conditional upon the annualized change in household employment is positive?

Problem Y. Consider US real GDP (in billions of chained 2000 dollars):

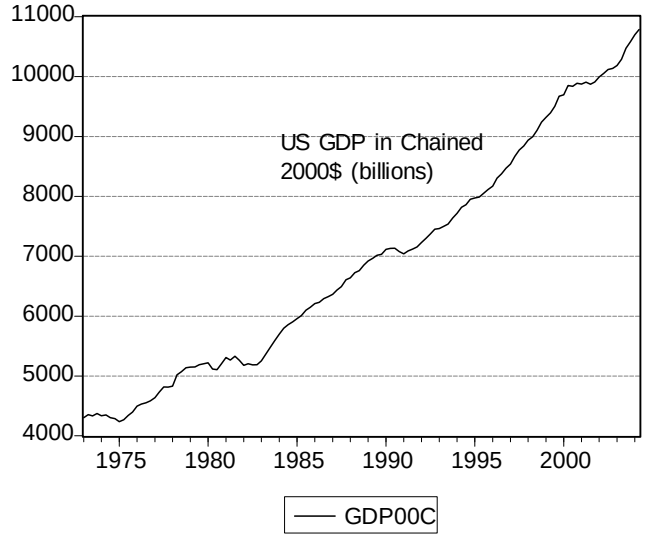

Figure 3: US GDP in chained 2000$ (billions), 1973q1-2004q2. Source: BEA accessed September 30, 2004.

The annualized percent change in GDP looks like this:

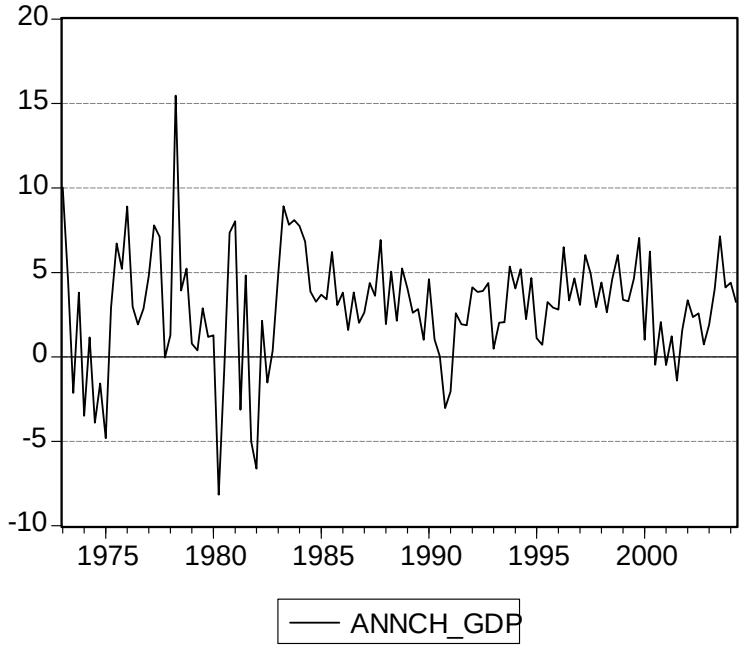

Figure 4: Annualized quarter-on-quarter change in US real GDP.

The histogram of this data is presented above:

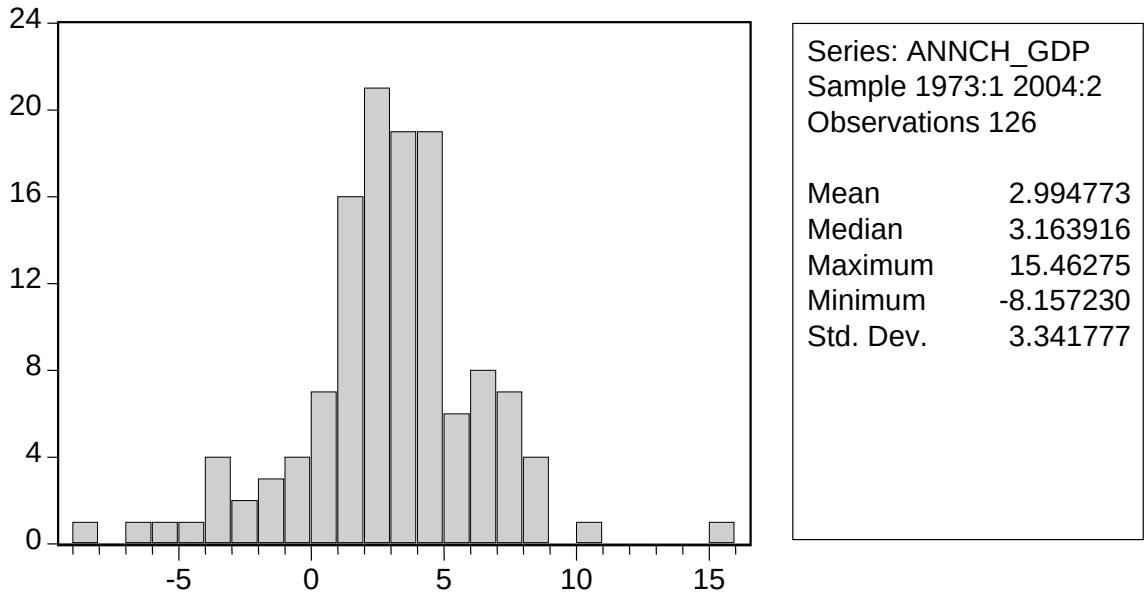

Figure 5: Histogram of annualized quarter-on-quarter percent change in US GDP over 1973q1-2004q2 period.

An annualized quarter-on-quarter percent change in a variable *Z*, is calculated as follows:
$ANNCH\_Z = 400 \times [\log(Z_t) - \log(Z_{t-1})]$

Y.1 What is the probability that quarter-on-quarter growth in payroll employment will be greater than 4.5% on an annualized basis? (You can assume the distribution is normal).

Y.2 What is the probability that payroll employment will exceed 4.5% on an annualized basis for each of the next four quarters? (For purposes of this question, you may assume that growth rates in one quarter are independent of what occurs in the preceding quarter).

e310ps2_f04.doc
4.10.2004