Economics 310
Fall 2004
University of Wisconsin-Madison

Menzie D. Chinn
Social Sciences 7418

Problem Set 5

This problem set is due in lecture on **Wednesday, December 15th**. No late problem sets will be accepted. **Be sure to show your work** (that is, do not use a spreadsheet or statistical program to generate your answers), and to write your name, ID number, as well as the name of your Teaching Assistant, on your problem set.

Answer all these problems. They are from the textbook, with the exception of Problem W which is written out.

- 12.12
- 12.30
- 12.52
- 13.28

Problem W. Below are plotted data for the trade balance as a share of GDP for the US and US GDP. The idea is that when the US economy booms, imports rise, and the trade balance deteriorates.

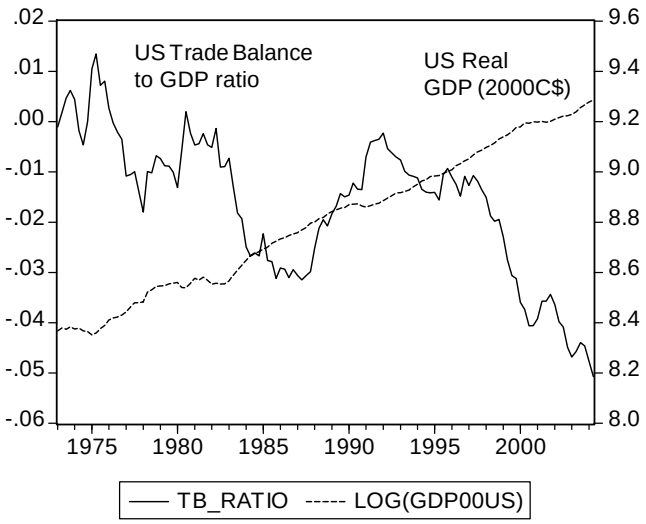


Figure 1: Time series for Trade Balance to GDP Ratio and US Real GDP. Sources: BEA.

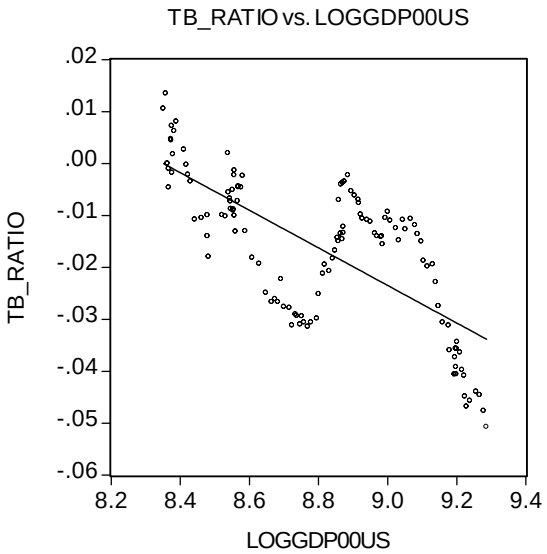


Figure 2: Scatter plot of Trade Balance Ratio and US Real GDP.

Dependent Variable: TB_RATIO
Method: Least Squares
Date: 12/07/04 Time: 20:08
Sample: 1973:1 2004:2
Included observations: 126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.302216	0.027757	10.88792	0.0000
LOGGDP00US	-0.036190	0.003152	-11.48326	0.0000

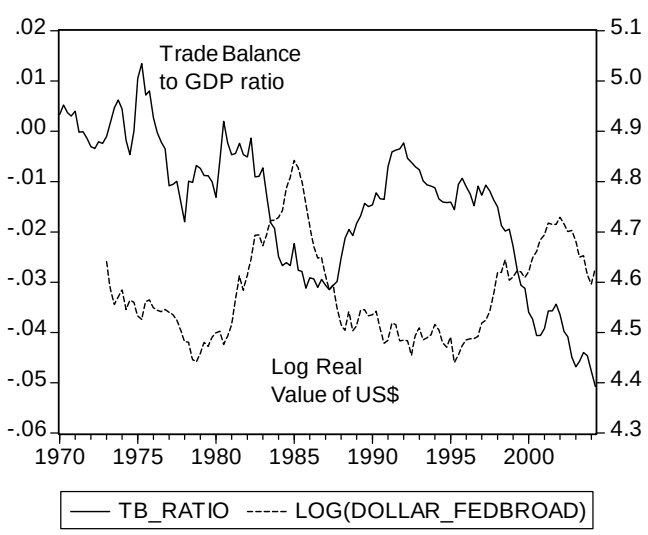
R-squared	0.515370	Mean dependent var	-0.016365
Adjusted R-squared	0.511462	S.D. dependent var	0.014116
S.E. of regression	0.009867	Akaike info criterion	-6.383591
Sum squared resid	0.012071	Schwarz criterion	-6.338571
Log likelihood	404.1663	F-statistic	131.8653
Durbin-Watson stat	0.099030	Prob(F-statistic)	0.000000

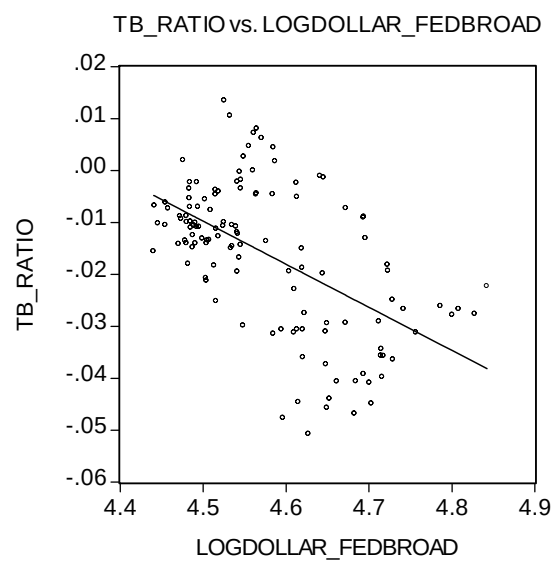
a. In words, interpret the coefficient on *LOGGDP00US* (where this is the log of *GDP00US*).
b. Conduct a one-sided t-test using a 1% significance level, for the following hypothesis test:

H_0: $\beta_1 = 0$
H_A: $\beta_1 < 0$

c. Calculate the standard error of the regression, using the statistics reported in the output (show your work!).
d. Calculate the value of the "S.E. of regression" using the "Sum of squared resid" (also termed the Sum of Squared Errors in the textbook).
e. Calculate the R-squared using the values for SSE and the "S.D. dependent var" (which is the standard deviation of the dependent variable).

The above story omits some other relevant factors. When the rest-of-the-world booms, then their imports (our exports) rise, so the rest-of-world GDP (*GDP96_ROW*) should enter. But what should also matter is the real value of the US dollar (*DOLLAR_FEDBROAD*), which determines how expensive American goods are relative to foreign. Figures 3 and 4 depict the trade balance and the dollar value (in logs).





Then the following multiple regression might be estimated:

Dependent Variable: TB_RATIO
Method: Least Squares
Date: 12/07/04 Time: 20:16
Sample: 1973:1 2004:2
Included observations: 126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.222852	0.121408	10.07225	0.0000
LOGGDP00US	-0.170249	0.025061	-6.793372	0.0000
LOGGDP96_ROW	0.127615	0.023124	5.518824	0.0000
LOGDOLLAR_FEDBROAD	-0.064503	0.006561	-9.830690	0.0000

R-squared	0.771246	Mean dependent var	-0.016365
Adjusted R-squared	0.765621	S.D. dependent var	0.014116
S.E. of regression	0.006834	Akaike info criterion	-7.102585
Sum squared resid	0.005698	Schwarz criterion	-7.012544
Log likelihood	451.4628	F-statistic	137.1082
Durbin-Watson stat	0.265394	Prob(F-statistic)	0.000000

f. Interpret the coefficient on *LOGGDP00US* in this context.
g. Is the coefficient on *LOGGDP00US* still statistically significantly different from zero? Is the coefficient economically different?
h. Calculate the standard error of the regression, using the statistics reported in the output (again, show your work!).
i. Form a 95% confidence interval around the coefficient on *LOGDOLLAR_FEDBROAD*.
j. If the dollar were to depreciate by 20%, what would happen to the trade balance, and by how much?