

## Problem Set 4

This problem set is due in lecture on **Wednesday, December 1st**. 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. Numbered problems refer to the textbook problems.

- 8.16                      • 8.56                      • 8.82                      • 9.36
- 8.20                      • 8.62                      • 9.2                        • 9.44
- 8.30                      • 8.72                      • 9.22                     • 9.60
- 8.50                      • 8.80                      • 9.28                     • 9.70
  
- Problem X.1

During the late 1990s, there was a belief that Europe lagged behind the United States in productivity growth, especially over the 1995q1-2000q4 period (shaded area in the graph below).

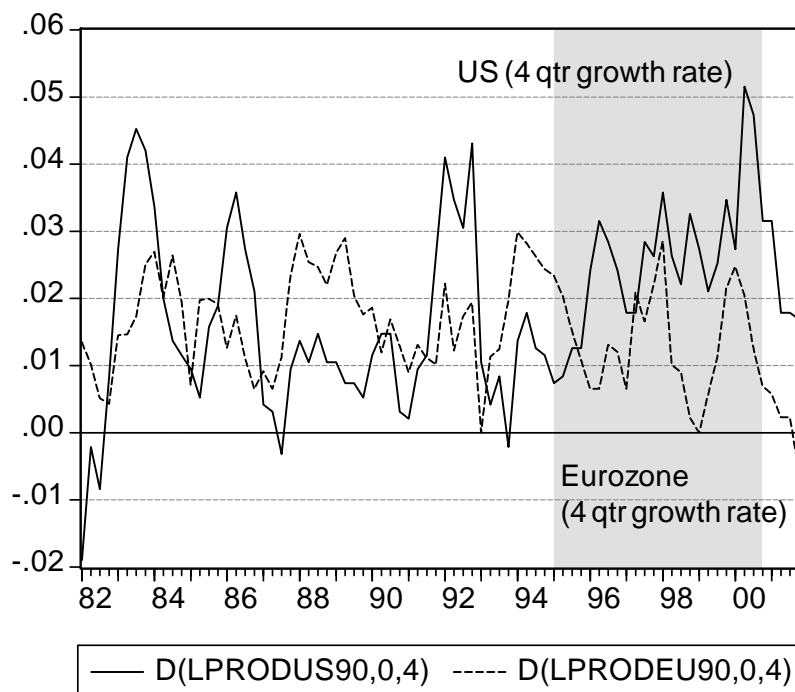


Figure 1: US and Eurozone 4 quarter growth rates.

Here are some statistics below on quarter-on-quarter annualized growth rates and differences in growth rates between the two economies.

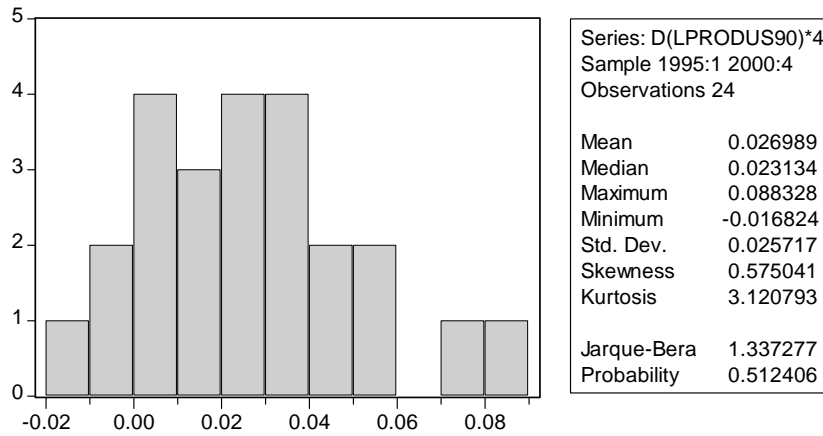


Figure 2: Histogram for United States qoq annualized GDP growth

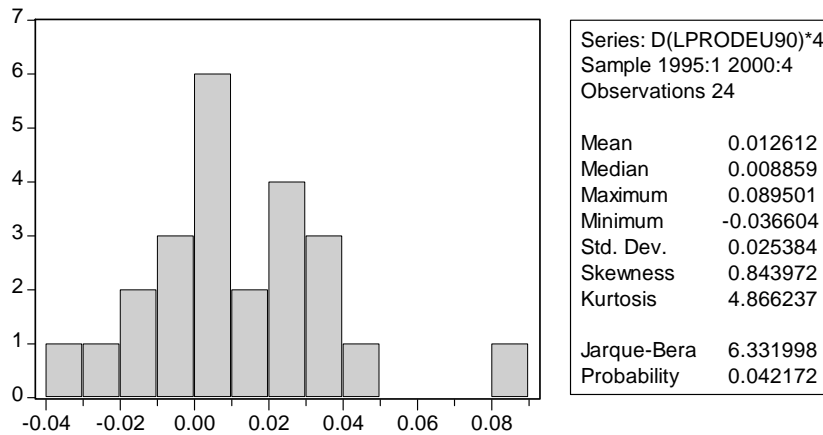


Figure 3: Histogram for Eurozone qoq annualized GDP growth

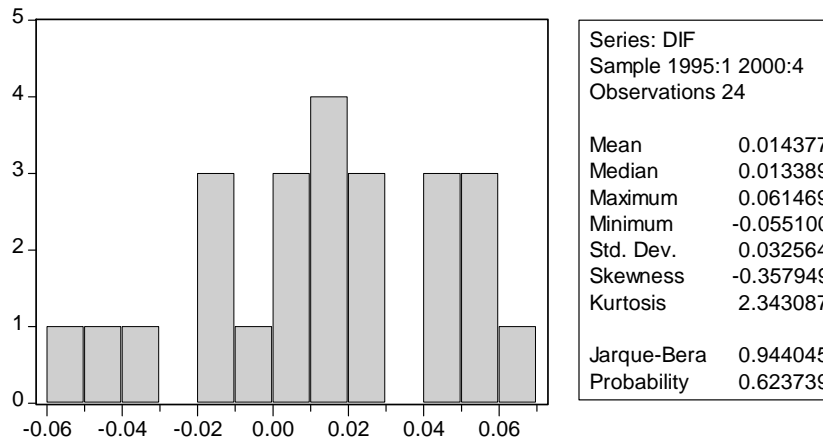


Figure 4: Histogram for  $DIF = (d(lprodus90)-d(lprodeu90))*4$

X.1.a. Conduct a test for difference in means between the US and Eurozone, assuming independent sampling, and setting the probability of Type I error equal to 2.5%.

X.1.b. Conduct a test for difference in means between the US and Eurozone assuming paired sampling, and once again setting the probability of Type I error equal to 2.5%.

X.1.c. Which testing procedure is more appropriate? Why?

- Problem X.2

Consider the following data pertaining to annualized quarter-on-quarter growth rates of real US GDP (in 1996 chained dollars) over the last 25 years.

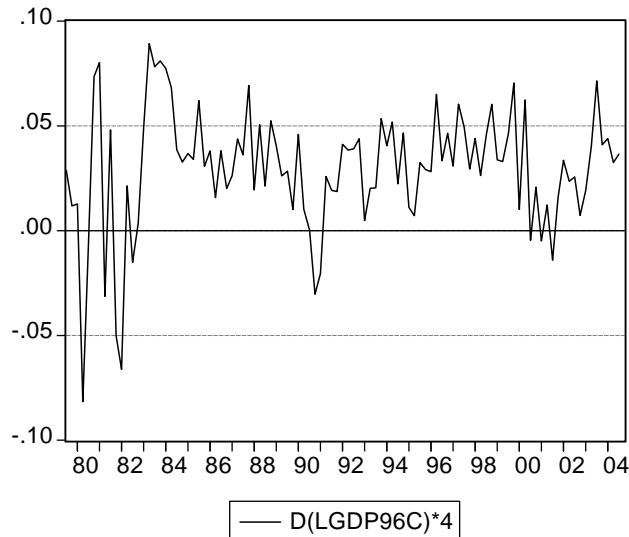


Figure 5: US qoq annualized GDP growth rate, 1979q1-2004q3

X.2.a. Suppose one wanted to test the hypothesis that the variability of US GDP growth was greater than 2.5%. Write out the hypothesis test, given the following information.

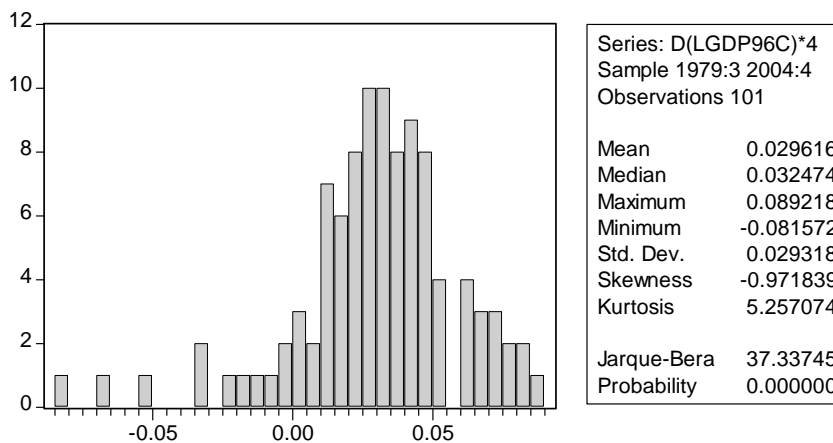


Figure 6: Histogram for United States qoq annualized GDP growth, 1979q3-2004q3.

X.2.b. Conduct the hypothesis test, using the data provided. What is your conclusion, setting  $\alpha = 0.05$ ?

X.2.c. What assumptions do you need to impose in order to arrive at your conclusion?

- X.3. There is a widespread view that the US macroeconomy has been more “stable” since 1984.

X.3.a. Write out a hypothesis test that the economy has been more stable in the post-1984 era.

X.3.b. Conduct the appropriate test, using the statistics provided below, and setting Type I error equal to 1%.

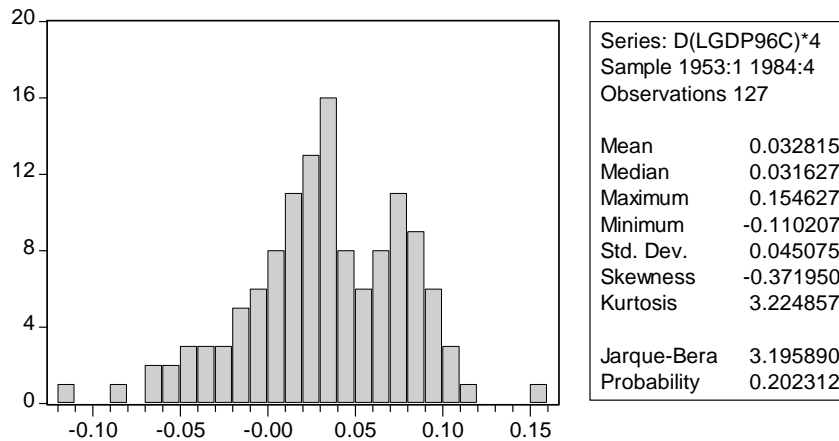


Figure 7: Histogram for United States qoq annualized GDP growth, 1953q1-1984q4

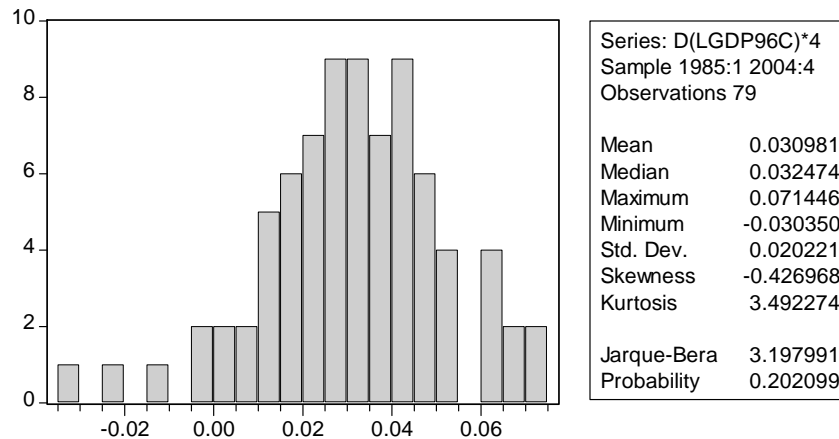


Figure 8: Histogram for United States qoq annualized GDP growth, 1985q1-2004q3

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