WORKSHOP

You work for a local exchange carrier (LEC) whose regulator has decided to allow competition for intraLATA toll service. To meet the anticipated prices of competitors, the LEC has applied to the regulator to lower its intraLATA toll rates; the LEC has also requested rate increases for other services in a revenue-neutral fashion. That is, the loss in revenues from intraLATA toll service is recouped with higher revenues from other services.

The amount of revenue loss from lower intraLATA toll rates depends critically on the elasticity of demand for intraLATA toll calls. The elasticity is the percent change in demand that results from a percent change in rates. (For example, if rates drop by 10% and demand increases by 4% in response to this rate reduction, then the elasticity is -0.4, with the negative sign meaning that demand moves in the opposite direction from rates.) A large elasticity (that is, large magnitude) means that the rate reduction will reduce revenues only a small amount. At an extreme, an elasticity of -1.0 means no revenue loss (demand increases by the same percentage that rates drop, such that revenues remain unchanged). A low elasticity means a large revenue loss. At an extreme, an elasticity of zero means that revenues drop by the same percent as the rate reduction (because demand does not expand at all in response to the lower rates).

Your task is to estimate the elasticity of demand for intraLATA toll calls. Your estimated elasticity will be submitted to the regulator as evidence of the extent of revenue loss from intraLATA service and the need to raise rates for other services.

Your data consist of your LEC's records of intraLATA toll demand and prices from 1984 through mid-1992. For each month you have information on the number of intraLATA toll message units and a price index for intraLATA toll rates. You also obtain a measure of aggregate income in the LEC's service territory for each quarter (this measure comes from DRI's county-level data aggregated over the counties in your service territory).

The data are contained in the ASCII file LATA.ASC. There is one observation for each month, starting with January of 1984 and ending in June of 1992 (for 102 observations). Each variable is expressed in logs, and the variables are:

LMOU	log of the intraLATA message units
LP	log of the price index (in real terms)
LI	log of income (in real terms)

The TSP command file **lata1.tsp** loads the data and calculates summary statistics. Note the use of the top command, **freq**.

1. Regress the log of intraLATA message units on a constant, the log of the price index, and the log of income. Look at the value of the coefficients and interpret them as elasticities. Do the values make sense?

2. Use the Durbin-Watson statistic to test the hypothesis of no autocorrelation in the disturbance terms.

3. To further examine the nature of the autocorrelation, plot the fitted OLS residuals against time using the command `plot @res` , which plots the variable **@res** in which TSP saves the fitted residuals. Also regress the fitted residual on its own lagged value, without an intercept.

   Hint: Use the TSP command to create lagged variables. For example, one-period lag of **@res** is created with the TSP statement

   ```
   @res(-1);
   ```

   In regressions, you should simply include the lag expression in the list of explanatory variables. TSP will set the **smpl** for you. For example,

   ```
   olsq @res @res(-1);
   ```

   regresses residuals on their lagged values.

   What does your output suggest?

4. Correct for serial correlation using quasi-first differences. That is, use the estimate of ρ from step 3 (0.4236) to create new dependent and explanatory variables. Then run a regression on the new variables. The TSP commands are:

```
genr lmouq = lmou - 0.4236*lmou(-1);
genr lpq = lp - 0.4236*lp(-1);
genr liq = li - 0.4236*li(-1);
olsq lmouq c lpq liq;
```

5. Use the TSP command **ar1** to estimate a regression with automatic and iterative correction for serial correlation. The **ar1** command takes the same form as **olsq**; that is, the command is "**ar1**" followed by the dependent and then the explanatory variables. For our data, the command is:

```
ar1 lmou c lp li;
```

   What is the estimated value of the autocorrelation coefficient? How does it compare to the estimate obtained in step 3? What is the estimated price elasticity? How does it compare to the estimates in steps 1 and 4?

One can use the regression of fitted residuals on lagged values to test for higher orders of autocorrelation. Take the fitted residuals from the **ar1** command and regress them on several lags of themselves. For example, **olsq @res @res(-1) @res(-2);** . Do you find any evidence of more autocorrelation?