This problem returns to the sales/advertising dataset with which you worked on Problem #26. The outreg tables below show the results of regressions of sales on zero to six lags of advertising. In the first table, there is no lagged dependent variable; in the second one lag of sales is included on the right-hand side. All regressions have a common sample period that omits the first 6 observations.

The lines at the bottom of the table report the Akiake Information Criterion (AIC), Schwartz-Bayesian Information Criterion (BIC), the first two estimated autocorrelations of the residuals— AC(1) and AC(2) are $\hat{\rho}_1$ and $\hat{\rho}_2$,—and the Box-Ljung Q statistics testing whether the first [Q(1)] and whether the first two [Q(2)] autocorrelations are zero. The Q statistics are distributed as χ^2 statistics with degrees of freedom equal to the number of autocorrelations being tested (one or two).

To help you learn about relevant Stata commands in time series, the do file that created the first table is:

```
forvalues j=0/6 {
      reg sales l(0/`j').adv if t>6
      estat ic
      matrix ics=r(S)
      local aic = ics[1,5]
      local bic = ics[1,6]
      predict ehat , resid
      corrgram ehat
      outreg2 using dp_24_ar0_out , word addstat( AIC, `aic' , BIC, `bic' , ///
            AC(1), r(ac1), Q(1), r(q1), AC(2), r(ac2), Q(2), r(q2) )
      drop ehat
      }
```

Do file tips:

- Note how the do file treats the index variable j that counts the number of lags. The forvalues statement runs the commands enclosed between { and } for each value of j running from 0 to 6. Each time through the loop, the value of j (number of lags) replaces the `j' expression in the reg statement.
- The estat ic command calculates the information criteria and places them in the r(S) results matrix for retrieval. The matrix ics=r(S) puts these results into a local matrix and the two local commands after that place the relevant elements into scalars that can be printed in outreg2. The corrgram command calculates the autocorrelations of the ehat series of residuals created by the predict command and puts them and the Q statistics into the r( ) arrays that are used in the outreg2 command. (This problem was created before the newest outreg was available.)

- The do file for the second table differs only by including l.sales as a regressor (and changing the file name in the outreg2 command).

Results with no lagged dependent variable

VARIABLES	(1) sales	(2) sales	(3) sales	(4) sales	(5) sales	(6) sales	(7) sales
adv	6.006***	2.331***	2.414***	2.700***	2.734***	2.635***	2.676***
	(0.625)	(0.845)	(0.815)	(0.814)	(0.815)	(0.821)	(0.823)
L.adv		4.936***	2.752***	2.577**	2.670**	2.701***	2.590**
		(0.843)	(1.030)	(1.018)	(1.023)	(1.024)	(1.033)
L2.adv			2.877***	1.465	1.390	1.316	1.329
			(0.831)	(1.028)	(1.032)	(1.034)	(1.036)
L3.adv				1.867**	1.280	1.335	1.285
				(0.822)	(1.029)	(1.030)	(1.033)
L4.adv					0.780	1.384	1.437
					(0.823)	(1.026)	(1.028)
L5.adv						-0.812	-0.294
						(0.823)	(1.022)
L6.adv							-0.701
							(0.821)
Constant	21.93***	20.63***	19.83***	19.24***	18.98***	19.29***	19.53***
	(0.652)	(0.630)	(0.651)	(0.692)	(0.742)	(0.804)	(0.855)
Observations	151	151	151	151	151	151	151
R-squared	0.383	0.499	0.537	0.552	0.555	0.558	0.560
AIC	513.2	483.8	473.9	470.7	471.7	472.7	474.0
BIC	519.2	492.8	486.0	485.8	489.8	493.8	498.1
AC(1)	0.149	0.0202	-0.0224	-0.0353	-0.0394	-0.0384	-0.0442
Q(1)	3.552	0.0647	0.0795	0.196	0.242	0.229	0.301
AC(2)	0.0735	-0.0319	-0.0660	-0.0518	-0.0439	-0.0534	-0.0532
Q(2)	4.422	0.227	0.773	0.620	0.544	0.673	0.741

Results with one lag of dependent variable

VARIABLES	(1) sales	(2) sales	(3) sales	(4) sales	(5) sales	(6) sales	(7) sales
L.sales	0.283***	0.131*	0.0280	-0.0236	-0.0395	-0.0329	-0.0391
	(0.0683)	(0.0735)	(0.0798)	(0.0819)	(0.0834)	(0.0837)	(0.0841)
adv	4.766***	2.362***	2.417***	2.709***	2.752***	2.653***	2.699***
	(0.664)	(0.839)	(0.818)	(0.817)	(0.818)	(0.825)	(0.827)
L.adv		4.122***	2.687**	2.625**	2.759***	2.775***	2.672**
		(0.953)	(1.049)	(1.035)	(1.043)	(1.044)	(1.051)
L2.adv			2.734***	1.533	1.497	1.408	1.438
			(0.928)	(1.058)	(1.059)	(1.063)	(1.065)
L3.adv				1.936**	1.340	1.383	1.340
				(0.859)	(1.039)	(1.041)	(1.042)
L4.adv					0.855	1.426	1.489
					(0.840)	(1.034)	(1.037)
L5.adv						-0.785	-0.239
						(0.828)	(1.032)
L6.adv							-0.732
							(0.826)
Constant	15.24***	17.74***	19.25***	19.70***	19.73***	19.90***	20.28***
	(1.728)	(1.733)	(1.765)	(1.752)	(1.752)	(1.762)	(1.813)
Observations	151	151	151	151	151	151	151
R-squared	0.447	0.510	0.537	0.553	0.556	0.559	0.561
AIC	498.6	482.5	475.8	472.6	473.5	474.6	475.7
BIC	507.7	494.6	490.9	490.7	494.6	498.7	502.9
AC(1)	-0.193	-0.113	-0.0490	-0.0135	-0.00251	-0.00750	-0.00787
Q(1)	5.938	2.042	0.379	0.0288	0.000987	0.00872	0.00954
AC(2)	0.0151	-0.0342	-0.0636	-0.0543	-0.0476	-0.0564	-0.0566
Q(2)	5.975	2.229	1.023	0.494	0.357	0.505	0.507

Which regression specification(s) do you prefer, both within each table and between the two tables, and why? (If there is more information that you would like to have in order to make a decision, tell what you want and how you would use it.)