UNIVERSIDAD CARLOS III DE MADRID
ECONOMETRICS I
Academic year 2006/07
FINAL EXAM

September, 22nd, 2007

PROBLEM TEXT

Very important: Notice that some results may have been omitted from the tables.

PROBLEM 1: MONEY DEMAND

The conventional specification for money demand posits

$$\ln\left(\frac{M}{P}\right) = \alpha_1 + \alpha_2 RS + \alpha_3 \ln Y + \zeta, \qquad (*)$$

where "ln" stands for natural logarithm, M = total amount of money, P = price index, RS = short run interest rate (which takes values between 0 and 1), Y = transaction volume (income).

The quantitative money theory establishes the following accounting identity:

$$MV = P\,Y,$$

where V = velocity of money. Taking natural logarithms, we can write such identity in additive form:

$$m + v = p + y,$$

or, equivalently,

$$-v = m - p - y,$$

where $m = \ln M$, $v = \ln V$, $p = \ln P$, $y = \ln Y$.

Furthermore, the short run interest rate, RS, can be an endogenous variable. As potential instruments, we have available the long run interest rate, RL, as well as the short run interest rate two years ago, $RS(-2)$.

We consider two alternative specifications:

$$-v_t = \beta_1 + \beta_2 RS_t + u_t, \qquad (1)$$

$$-v_t = \delta_1 + \delta_2 RS_t + \delta_3 y_t + \varepsilon_t. \qquad (2)$$

The following results are based on estimating the money demand for the United Kingdom between 1874 and 1970:

OUTPUT 1: OLS estimates using the 97 observations $1874 - 1970$
Dependent variable: $-v$

Variable	Coefficient	Std. Error	t-statistic	p-value
C	-0.309479	0.022446	-13.78742	0.0000
RS	-7.005548	0.634474	-11.04150	0.0000

Mean of dependent variable	-0.525011
S.D. of dependent variable	0.164059
Standard error of residuals	0.109142
R^2	0.562040
Adjusted $\bar{R}^2$	0.557430
Durbin-Watson statistic	0.327830

OUTPUT 2: TSLS estimates using the 97 observations $1874 - 1970$
Dependent variable: $-v$
Instruments: RL, $RS(-2)$

Variable	Coefficient	Std. Error	t-statistic	p-value
C	-0.324494	0.026089	-12.43802	0.0000
RS	-6.517483	0.767152	-8.495690	0.0000

OUTPUT 3: OLS estimates using the 97 observations $1874 - 1970$
Dependent variable: RS

Variable	Coefficient	Std. Error	t-statistic	p-value
C	-0.007971	0.003011	-2.647508	0.0095
RL	0.688677	0.097922	7.032898	0.0000
$RS(-2)$	0.417955	0.083551	5.002412	0.0000

Mean of dependent variable	0.030766
S.D. of dependent variable	0.017557
Standard error of residuals	0.009906
Sum of squared residuals	0.009224
R^2	0.688276
Adjusted $\bar{R}^2$	0.681643

OUTPUT 4: OLS estimates using the 97 observations $1874 - 1970$
Dependent variable: $-v$

Variable	Coefficient	Std. Error	t-statistic	p-value
C	-0.324494	0.026089	-12.43802	0.0000
RS	-6.517483	0.767152	-8.495690	0.0000
$res3$	-1.565694	1.367535	-1.144903	0.2552

Mean of dependent variable	-0.525011
S.D. of dependent variable	0.164059
Standard error of residuals	0.108964
R^2	0.568063
Adjusted $\bar{R}^2$	0.558873

(NOTE: $res3$ are the residuals from OUTPUT 3)

OUTPUT 5: OLS estimates using the 95 observations $1876 - 1970$
Dependent variable: e (Note: e are the residuals from OUTPUT 1)

Variable	Coefficient	Std. Error	t-statistic	p-value
C	0.000268	0.006242	0.042884	0.9659
$e(-1)$	0.850289	0.104457	8.140077	0.0000
$e(-2)$	-0.017044	0.104623	-0.162905	0.8710

Mean of dependent variable	0.000289
S.D. of dependent variable	0.109702
Standard error of residuals	0.108964
R^2	0.699037
Adjusted $\bar{R}^2$	0.692494
Durbin-Watson statistic	1.983758

(Note: $e(-1)$, $e(-2)$ denote the first and second
lag of the residuals in OUTPUT 1)

OUTPUT 6: OLS estimates using the 97 observations $1874 - 1970$
Dependent variable: $-v$
Standard deviations robust to serial correlation, lag(s) order 3

Variable	Coefficient	Std. Error	t-statistic	p-value
C	−0.309479	0.040132	−7.711609	0.0000
RS	−7.005548	1.032501	−6.785029	0.0000

Mean of dependent variable	−0.525011
S.D. of dependent variable	0.164059
R^2	0.562040
Adjusted $\bar{R}^2$	0.557430
Durbin-Watson statistic	0.327830

OUTPUT 7: OLS estimates using the 97 observations 1874 − 1970
Dependent variable: $-v$
Standard deviations robust to serial correlation, lag(s) order 3

Variable	Coefficient	Std. Error	t-statistic	p-value
C	−0.652518	0.290490	−2.246268	0.0270
RS	−7.333019	1.114031	−6.582422	0.0000
y	0.042682	0.037187	1.147754	0.2540

Mean of dependent variable	−0.525011
S.D. of dependent variable	0.164059
R^2	0.576082
Adjusted $\bar{R}^2$	0.557230

OUTPUT 8: OLS estimates using the 97 observations 1874 − 1970
Dependent variable: $-v$
Standard deviations robust to heterokedasticity, variant HC1

Variable	Coefficient	Std. Error	t-statistic	p-value
C	−0.652518	0.168034	−3.88325	0.00020
RS	−7.333019	0.701298	−10.45636	0.00000
y	0.042682	0.019122	2.23209	0.02798

OUTPUT 9: OLS estimates using the 97 observations 1874 − 1970

Dependent variable: $-v$

Variable	Coefficient	Std. Error	t-statistic	p-value
C	-0.652518	0.168834	-3.86485	0.00020
RS	-7.333019	0.700075	-10.47462	0.00000
y	0.042682	0.019002	2.24618	0.02703

Mean of dependent variable	-0.525011
S.D. of dependent variable	0.164059
R^2	0.576082
Adjusted $\bar{R}^2$	0.557230

PROBLEM 2: EFFECT OF THE ETHNIC ORIGIN ON DEATH PENALTY

Some experts believe that in the United States the probability of being condemned to death is higher, *ceteris paribus*, when the accused is black. To evaluate such hypothesis, we analyze 679 in different States where the death penalty can be applied. In this sample, the proportion of white victims is 76%. We consider the following variables:

CONDENA = binary variable that equals 1 if the accused is condemned to death and 0 otherwise;
RAZA_ACUSADO = binary variable that equals 1 if the accused is black and 0 otherwise;
RAZA_VICTIMA = binary variable that equals 1 if the victim is black and 0 otherwise.

We obtained the following results:

OUTPUT 1: Logit estimates using the 679 observations $1 - 679$
Dependent variable: CONDENA

Variable	Coefficient	Std. Error	t-statistic	Slope*
C	-2.08	0.14	-14.86	
RAZA_ACUSADO	-0.39	0.31	-1.26	-0.0356

*At mean

Mean of CONDENA = 0.102
Number of 'correctly predicted' cases = 610 (89.8 percent)
McFadden's Pseudo-$R^2 = 0.0040$
$f(\beta' x)$ at mean of independent variables = 0.090
Log-likelihood = -222.25
Likelihood ratio test: $\chi^2_1 = 1.770$

OUTPUT 2: Logit estimates using the 679 observations $1 - 679$
Dependent variable: CONDENA

Variable	Coefficient	Std. Error	t-statistic	Slope*
const	-2.04	0.61	-7.26	
RAZA_ACUSADO	0.83	0.36	2.31	0.0644
RAZA_VICTIMA	-2.39	0.60	-3.98	-0.1861

*At mean

Number of 'correctly predicted' cases = 610 (89.8 percent)
McFadden's Pseudo-$R^2 = 0.0496$
$f(\beta' x)$ at mean of independent variables = 0.078
Log-likelihood = -212.07
Likelihood ratio test: $\chi^2_2 = 22.13$