

Part B: Model Diagnostics

Q.B.1. P.1.a.  $t_{obs} = \frac{.06}{.008391} = 7.151$   $t_{.025, 23} = 2.069$

P.1.b.  $F_{obs} = \frac{1.585884/1}{0.713406/23} = 51.128$   $F_{.05, 1, 23} = 4.279$

P.1.c.  $\chi^2_{BP} = \frac{0.007959/2}{(0.713406/25)^2} = 4.887$   $\chi^2_{.05, 1} = 3.841$

Q.B.2. P.2.a.  $r^2 = \frac{7073.7}{7811.0} = .9675$   $r = -.9836$

P.2.b.  $DW = \frac{164.4}{237.3} = 0.68$  Reject  $H_0$

P.2.c. OLS:  $-0.863 \pm 2.069(0.053) = -0.863 \pm 0.108 = (-0.931, -0.795)$   
 EGLS:  $-0.845 \pm 2.074(0.055) = -0.845 \pm 0.114 = (-0.959, -0.731)$

Q.B.3. P.3.a.  $t_{obs} = \frac{5.32}{0.40} = 13.3$   $t_{.025, 137} \approx 1.978$  P.3.b.  $F_{obs} = \frac{45933.13}{\frac{55074.41}{137}} = 179.41$   
 $F_{.05, 1, 137} \approx 3.920$

P.3.c.  $\chi^2_{BP} = 8.406$   $\chi^2_{.05, 1} = 3.841$

Q.B.4. P.4.a.  $(-0.451822, -0.411444)$  P.4.b. Yes P.4.c. (df=15):  $(-0.4884, -0.4092)$

Q.B.5. P.5.a.  $t_{obs} = 4.558$   $t_{.025, 41} \approx 2.020$  P.5.b.  $F_{obs} = 20.623$   $F_{.05, 1, 41} = 4.080$

P.5.c.  $\chi^2_{BP} = 30.759$   $\chi^2_{.05, 1} = 3.841$

Q.B.6. P.6.a.  $F_{obs} = 6.547$   $F_{.05} \approx 3.308$   $R^2 = 0.297$  P.6.b.  $DW = 1.87$  No

P.6.c. using  $t_{.025, 30} = 2.042$  for both: OLS:  $(0.46, 1.64)$ , EGLS:  $(0.45, 1.63)$

Q.B.7. P.7.a.

| Source     | df | SS     | MS     | F      | F <sub>.05</sub> |
|------------|----|--------|--------|--------|------------------|
| Regression | 1  | 2420.1 | 2420.1 | 17.356 | 4.034            |
| Residual   | 50 | 6816.6 | 136.3  |        |                  |
| Total      | 51 | 9236.7 |        |        |                  |

P.7.b.  $SSR = 524.38$   $SSPE = 6293.23$   $F_{LR} = \frac{524.38/7}{6293.23/43} = 0.512$   $F_{.05, 7, 43} \approx 2.232$

Q.B.8. P.8.a.  $t_{obs} = -1.692$   $t_{.05, 43} \approx 1.681$  Reject if  $|t_{obs}| \geq 1.681$

P.8.b.  $X_{BP}^2 = 5.612$   $X_{.05, 1}^2 = 3.841$

Q.B.9. P.9.a. Dec. 1920: 33,343 June 1920: 67,130 Dec. 2010: 34,513 June 2010: 68,300

P.9.b.  $(.007, .019)$  P.9.c.  $DW = 1.57$  P.9.d. .9690

Q.B.10. P.10.a.  $F_{obs} = 8.496$   $F_{.05} = 3.422$  P.10.b.  $X_{BP}^2 = 770.76$   $X_{.05, 1}^2 = 5.991$

Q.B.11. P.11.a. Dec/1947: 54,7357 June/1947: 80,9357 Dec/2007: 56,3977 June/2007: 82,5777

P.11.b.  $(.0185, .0369)$  P.11.c.  $DW = 1.564$

Q.B.12. P.12.a.  $F_{obs} = 22.043$   $F_{.05} = 4.414$  P.12.b.  $X_{BP}^2 = 4.647$   $X_{.05, 1}^2 = 3.841$

Q.B.13. P.13.a.  $R^2 = .1999$  P.13.b.  $F_{obs} = 2.123$   $F_{.05} = 3.592$  P.13.c.  $DW = 1.796$  Accept  $H_0$

Q.B.14. P.14.a.  $\hat{Y}_6 = 1.3281$  P.14.b.  $SSPE = 1.2394$   $df_{PE} = 24$   $MSPE = 0.0516$

P.14.c.  $SSLF = 0.0936$   $df_{LF} = 4$   $MSLF = .0234$  P.14.d.  $F = \frac{0.4535}{.0234}, F_{.05} = 2.776$   
 $P > .05$

Q.B.15. P.15.a. unequal variance P.15.b.  $X_{BP}^2 = 3.963$   $X_{.05}^2 = 3.841$

Q.B.16. P.16.a. Model 1:  $df = 30 - 6 = 24$  Model 2:  $df = 30 - 2 = 28$

P.16.b.  $\hat{Y}_5 = 2.494$   $\hat{Y}_6 = 2.184$  P.16.c.  $SSLF = 1.586$   $SSPE = 16.866$   $F_{LF} = 0.564$   $F_{.05} = 2.776$

Q.B.17. P.17.a.  $t_{obs} = 4.164$   $t_{.025} \approx 1.995$  P.17.b.  $DW = 1.03$  (Pos. Autocorr)

P.17.c.  $X_{BP}^2 = 4.418$   $X_{.05}^2 = 3.841$

Q.B.18. P.18.a.  $\hat{Y}_4 = 4.2801$  P.18.b.  $SSPE = .2279$   $df_{PE} = 26$   $MSPE = .0088$

P.18.c.  $SSLF = 1.4046$   $df_{LF} = 2$   $MSLF = 0.7023$  P.18.d.  $F_{LF} = 79.81$   $F_{.05} = 3.369$

Q.B.19. P.19.a. Unequal variances (Maybe nonlinearity)

P.19.b.  $\chi^2_{181} = 263.44$      $\chi^2_{.05} = 12.592$

Q.B.20.     $SSPE = 115.71$      $df_{PE} = 181$      $MSPE = 0.64$

$SSLF = 119.33 - 115.71 = 3.52$      $df_{LF} = 183 - 181 = 2$      $MSLF = 1.76$

$F_{LF} = \frac{1.76}{0.64} = 2.75$      $F_{.05} \approx 3.046$     Fail to Reject  $H_0$ .