

Computing Assignment VII

YEP

March 9, 2018

Q1

```
##
## Call:
## lm(formula = ln_qs ~ ln_fp + ln_w + trendsp1 + trendsp2 + trendsp3,
##     data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.0290438 -0.0086555  0.0003188  0.0099855  0.0217982
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -6.255e+01  1.437e+00 -43.518  < 2e-16 ***
## ln_fp        8.876e-02  1.164e-02   7.628 8.06e-10 ***
## ln_w         1.240e+00  9.017e-02  13.748  < 2e-16 ***
## trendsp1     3.573e-02  7.353e-04  48.593  < 2e-16 ***
## trendsp2    -1.497e-02  3.196e-03  -4.684 2.34e-05 ***
## trendsp3     1.943e-02  8.958e-03   2.169  0.0351 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01351 on 48 degrees of freedom
## (2 observations deleted due to missingness)
## Multiple R-squared:  0.999, Adjusted R-squared:  0.9989
## F-statistic: 9306 on 5 and 48 DF, p-value: < 2.2e-16
```

Q1

```
##
## Call:
## lm(formula = ln_qd ~ ln_sp + trendsp1 + trendsp2 + trendsp3,
##     data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.041927 -0.005848  0.001661  0.009331  0.028222
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -6.996e+01  1.376e+00 -50.843  < 2e-16 ***
## ln_sp       -1.729e-02  1.069e-02  -1.618   0.112
## trendsp1     3.959e-02  7.019e-04  56.409  < 2e-16 ***
## trendsp2    -3.800e-02  2.948e-03 -12.893  < 2e-16 ***
## trendsp3     8.425e-02  8.440e-03   9.982 2.68e-13 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01482 on 48 degrees of freedom
## (3 observations deleted due to missingness)
## Multiple R-squared:  0.9987, Adjusted R-squared:  0.9986
## F-statistic: 9181 on 4 and 48 DF,  p-value: < 2.2e-16
```

IV

```
##
## Call:
## ivreg(formula = ln_qs ~ ln_fp + ln_w + trendsp1 + trendsp2 +
##       trendsp3 | lag_ln_w + ln_w + trendsp1 + trendsp2 + trendsp3,
##       data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.031273 -0.008810  0.000693  0.010524  0.021979
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -62.371526   2.056715 -30.326 < 2e-16 ***
## ln_fp        0.101652   0.025147   4.042 0.000195 ***
## ln_w         1.290962   0.105966  12.183 3.78e-16 ***
## trendsp1     0.035627   0.001063  33.524 < 2e-16 ***
## trendsp2    -0.012933   0.005800  -2.230 0.030572 *
## trendsp3     0.013140   0.016528   0.795 0.430600
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01357 on 47 degrees of freedom
## Multiple R-Squared: 0.9989, Adjusted R-squared: 0.9988
## Wald test: 8481 on 5 and 47 DF,  p-value: < 2.2e-16
```

IV

```
##
## Call:
## ivreg(formula = ln_qd ~ ln_sp + trendsp1 + trendsp2 + trendsp3 |
##       ln_w + trendsp1 + trendsp2 + trendsp3, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.041116 -0.013250  0.004556  0.011713  0.037176
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -7.177e+01  1.785e+00 -40.212 < 2e-16 ***
## ln_sp        -6.329e-02  2.282e-02  -2.773 0.00788 **
## trendsp1     4.055e-02  9.175e-04  44.200 < 2e-16 ***
## trendsp2    -4.683e-02  5.038e-03  -9.294 2.63e-12 ***
## trendsp3     1.108e-01  1.483e-02   7.474 1.38e-09 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01745 on 48 degrees of freedom
## Multiple R-Squared:  0.9982, Adjusted R-squared:  0.998
## Wald test:  6625 on 4 and 48 DF, p-value: < 2.2e-16
```

Hausman Test

```
## [1] 0.33
```

Q4

```
##
## Call:
## lm(formula = log(area) ~ ln_fp + ln_w + trendsp1 + trendsp2 +
##     trendsp3, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.0258382 -0.0057512 -0.0000261  0.0060841  0.0213062
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.546e+01  1.163e+00 -13.298 < 2e-16 ***
## ln_fp        6.275e-02  9.411e-03   6.668 2.38e-08 ***
## ln_w        1.998e-01  7.293e-02   2.740 0.008600 **
## trendsp1     1.094e-02  5.947e-04  18.401 < 2e-16 ***
## trendsp2    -1.004e-02  2.585e-03  -3.886 0.000312 ***
## trendsp3     2.499e-02  7.245e-03   3.449 0.001180 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01092 on 48 degrees of freedom
## (2 observations deleted due to missingness)
## Multiple R-squared:  0.99, Adjusted R-squared:  0.9889
## F-statistic: 948.7 on 5 and 48 DF, p-value: < 2.2e-16
```