Jeremy Chan

ECN 140

PS 6

June 2, 2016

1. Problem 1
   1. The estimated beta for the standard consumption regression is .8700202. The robust standard error is .0160357. After allowing for country fixed effects, the estimated beta is now .8834073 with a robust standard error of .1328143.
   2. When regressing without country fixed effects, the regression presents a generalizable model which describes the relationship in all countries if they were aggregated together as a whole. In this case, however, countries may have different sensitivities to an increase in GDP. For instance, in a country which has been historically poor, individuals may be more prone to saving when an increase in GDP occurs. Thus, their relationship is different than a nation which tends to greatly increase their consumption because of a higher basic standard of living. Thus, regressing with fixed effects allows us to examine the relationship between per capita consumption and GDP at a country-specific level while taking into account omitted variables which affect both per-capita consumption and GDP regardless of time.
   3. Including time fixed effects would allow us to control for changes to both per-capita consumption and GDP over time. For instance, if a program is instituted in all countries which incentivizes savings for individuals, the relationship between consumption and GDP would be different before and after the program. Thus, including time fixed effects allows us to see what the relationship is on a per-year basis. By doing this, it creates an indicator variable for each year and gives you very specific effects, e.g. the relationship between per-capita consumption and GDP in the US in 2004.
2. Problem 2
   1. The estimated coefficient on quantity is -.5240965 and the estimated coefficient on book’s rating is .2119044. The estimate for the intercept is 7.188214. The estimate for the intercept looks fairly close to the given demand function, but the other two coefficients look extremely off in terms of magnitude, although their signs are correct.
   2. The estimated coefficient on price is .7942949. The estimated intercept is 8.453962. Again, the intercept is fairly close, but not exactly the same as the given supply function while the coefficient on price is not very close, albeit with the correct sign.
   3. In this case, it might be that using OLS is not a good idea because in the demand function, book ratings are not exogenous and cannot be accurately modeled as a function of price and quantity. Thus, there exists bias in our estimators.
   4. S would shift the demand curve, as an increase in book ratings would presumably drive demand for the book up. This shift in the demand curve allows us to trace out the supply curve.
   5. The estimates for the new supply curve are now 5.689543 for the intercept and 2.218834 for the coefficient, which are much more in line with the given supply curve values.
3. Question 3
   1. You would need to use instrumental variables when one of the explanatory variables is correlated with the error term. It may be the case that one of the explanatory variables is actually caused by the dependent variable or that there are explanatory variables which are omitted from the model. In these situations, ordinary linear regression produces biased and possibly inaccurate estimates.
   2. An instrument is valid if it meets the following two conditions:
      1. Covariance between the instrument and the instrumented variable ≠ 0.
      2. Covariance between the instrument and the error term = 0.
   3. The intuition behind IV estimation is that it allows for modeling of the direct effects of shifts in the explanatory variable due to the instrument on the dependent variable. This is often preferable to modeling the effect of the explanatory variable along with endogenous variables on the dependent variable. It also allows for reducing or eliminating omitted variable bias.
4. Question 4
   1. A difference-in-difference regression is appropriate because there may have been other changes in one state that the other did not have which also affected employment outcomes. In this way, the effect of the minimum wage raise is isolated from other effects which are not of interest.

|  |  |  |
| --- | --- | --- |
|  | New Jersey | Pennsylvania |
| Before wage raise | 17.06518 | 19.94872 |
| After wage raise | 17.57266 | 17.54221 |

The effect of raising the minimum wage is 2.91399.

* 1. At an alpha equals .05 level of significance, the effect does not seem statistically significant.

1. Question 5
   1. If the weekly earning cap increases for workers’ compensation, workers will try to maximize the amount of money they receive the new system, which may lead to an increase in the number of weeks in which workers claim the benefit.

|  |  |  |
| --- | --- | --- |
|  | High Earners | Low Earners |
| Before change | 11.76155 | 7.475044 |
| After Change | 13.93152 | 8.611527 |

The effect of changing the policy was 1.033487.

* 1. According to the regression framework, the only significant effect is being in the category of a high earner. The effect of the policy itself was not statistically significant.

Code Appendix

-----------------------------------------------------------------------------------------

name: <unnamed>

log: /Users/Jeremy/Documents/GitHub/ECN140-HW6/Final/Problem Set 6.log

log type: text

opened on: 1 Jun 2016, 22:06:38

. do "/Users/Jeremy/Documents/GitHub/ECN140-HW6/Final/Problem Set 6.do"

. // Problem 1

. use "/Users/Jeremy/Documents/GitHub/ECN140-HW6/Datasets/pwt63.dta"

.

. // Part a

. // Creating Variables

. gen lcons = log(cons)

. gen lrgdp = log(rgdpl)

.

. // Running regressions

. reg lcons lrgdp, robust

Linear regression Number of obs = 24

F(1, 22) = 2943.63

Prob > F = 0.0000

R-squared = 0.9904

Root MSE = .15065

------------------------------------------------------------------------------

| Robust

lcons | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

lrgdp | .8700202 .0160357 54.26 0.000 .8367642 .9032762

\_cons | .8343685 .1382019 6.04 0.000 .5477554 1.120982

------------------------------------------------------------------------------

. xi: regress lcons lrgdp i.country, robust

i.country \_Icountry\_1-4 (naturally coded; \_Icountry\_1 omitted)

Linear regression Number of obs = 24

F(4, 19) = 20763.27

Prob > F = 0.0000

R-squared = 0.9997

Root MSE = .03083

------------------------------------------------------------------------------

| Robust

lcons | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

lrgdp | .8834073 .1328143 6.65 0.000 .6054238 1.161391

\_Icountry\_2 | -.2452579 .5195288 -0.47 0.642 -1.332644 .8421284

\_Icountry\_3 | -.271061 .2797988 -0.97 0.345 -.8566867 .3145647

\_Icountry\_4 | .051424 .5444867 0.09 0.926 -1.0882 1.191048

\_cons | .8296293 .8672313 0.96 0.351 -.9855067 2.644765

------------------------------------------------------------------------------

.

. // Part c

. xi: regress lcons lrgdp i.country i.year, robust

i.country \_Icountry\_1-4 (naturally coded; \_Icountry\_1 omitted)

i.year \_Iyear\_2002-2007 (naturally coded; \_Iyear\_2002 omitted)

Linear regression Number of obs = 24

F(9, 14) = 14786.65

Prob > F = 0.0000

R-squared = 0.9998

Root MSE = .02853

------------------------------------------------------------------------------

| Robust

lcons | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

lrgdp | .6230649 .2560185 2.43 0.029 .0739598 1.17217

\_Icountry\_2 | .7915908 1.010389 0.78 0.446 -1.375478 2.958659

\_Icountry\_3 | .296603 .5493566 0.54 0.598 -.8816496 1.474856

\_Icountry\_4 | 1.137964 1.058431 1.08 0.300 -1.132144 3.408073

\_Iyear\_2003 | .0495838 .0276853 1.79 0.095 -.0097953 .108963

\_Iyear\_2004 | .0479873 .0227662 2.11 0.054 -.0008413 .0968159

\_Iyear\_2005 | .0490033 .0255835 1.92 0.076 -.0058678 .1038745

\_Iyear\_2006 | .0492981 .030295 1.63 0.126 -.0156782 .1142744

\_Iyear\_2007 | .0840769 .0401148 2.10 0.055 -.0019608 .1701147

\_cons | 2.46259 1.645154 1.50 0.157 -1.065914 5.991095

------------------------------------------------------------------------------

.

. // Problem 2

. use "/Users/Jeremy/Documents/GitHub/ECN140-HW6/Datasets/HW5.DTA", clear

.

. // Part a: estimating demand equation

. reg p q s

Source | SS df MS Number of obs = 100

-------------+---------------------------------- F(2, 97) = 35.65

Model | 17.6530502 2 8.82652511 Prob > F = 0.0000

Residual | 24.0168363 97 .247596251 R-squared = 0.4236

-------------+---------------------------------- Adj R-squared = 0.4118

Total | 41.6698865 99 .420907945 Root MSE = .49759

------------------------------------------------------------------------------

p | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

q | -.5240965 .2150125 -2.44 0.017 -.9508367 -.0973563

s | .2119044 .0482863 4.39 0.000 .1160696 .3077393

\_cons | 7.188214 2.151711 3.34 0.001 2.917664 11.45876

------------------------------------------------------------------------------

.

. // Part b: estimating supply equation

. reg q p

Source | SS df MS Number of obs = 100

-------------+---------------------------------- F(1, 98) = 43.87

Model | 26.2897166 1 26.2897166 Prob > F = 0.0000

Residual | 58.733428 98 .599320694 R-squared = 0.3092

-------------+---------------------------------- Adj R-squared = 0.3022

Total | 85.0231446 99 .858819642 Root MSE = .77416

------------------------------------------------------------------------------

q | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

p | .7942949 .1199274 6.62 0.000 .5563029 1.032287

\_cons | 8.453962 .2452659 34.47 0.000 7.96724 8.940684

------------------------------------------------------------------------------

.

. // Part e: instrumental regression

. ivreg q (p = s), first robust

First-stage regressions

-----------------------

Source | SS df MS Number of obs = 100

-------------+---------------------------------- F(1, 98) = 62.22

Model | 16.18196 1 16.18196 Prob > F = 0.0000

Residual | 25.4879266 98 .260080884 R-squared = 0.3883

-------------+---------------------------------- Adj R-squared = 0.3821

Total | 41.6698865 99 .420907945 Root MSE = .50998

------------------------------------------------------------------------------

p | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

s | .0979731 .0124207 7.89 0.000 .0733247 .1226216

\_cons | 1.944786 .0510009 38.13 0.000 1.843576 2.045995

------------------------------------------------------------------------------

Instrumental variables (2SLS) regression Number of obs = 100

F(1, 98) = 52.54

Prob > F = 0.0000

R-squared = .

Root MSE = 1.2092

------------------------------------------------------------------------------

| Robust

q | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

p | 2.218834 .3061126 7.25 0.000 1.611364 2.826305

\_cons | 5.689543 .6320685 9.00 0.000 4.435224 6.943862

------------------------------------------------------------------------------

Instrumented: p

Instruments: s

------------------------------------------------------------------------------

.

. // Problem 4

. use "/Users/Jeremy/Documents/GitHub/ECN140-HW6/Datasets/card\_minwages.dta", clear

.

. // part b

. sum emp if state == 1 & year == 1 // NJ before

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

emp | 326 17.06518 8.727993 3 80

. sum emp if state == 1 & year == 2 // NJ after

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

emp | 320 17.57266 8.778737 0 55.5

. sum emp if state == 2 & year == 1 // PA before

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

emp | 78 19.94872 11.67994 4.5 67.5

. sum emp if state == 2 & year == 2 // PA after

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

emp | 77 17.54221 7.909272 0 38.25

.

. // part c

. reg emp NJ W2 W2NJ

Source | SS df MS Number of obs = 801

-------------+---------------------------------- F(3, 797) = 2.15

Model | 524.003099 3 174.6677 Prob > F = 0.0919

Residual | 64600.6458 797 81.0547626 R-squared = 0.0080

-------------+---------------------------------- Adj R-squared = 0.0043

Total | 65124.6489 800 81.4058111 Root MSE = 9.003

------------------------------------------------------------------------------

emp | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

NJ | -2.883534 1.134812 -2.54 0.011 -5.111107 -.6559608

W2 | -2.40651 1.446314 -1.66 0.097 -5.245544 .4325237

W2NJ | 2.913982 1.610513 1.81 0.071 -.2473667 6.075331

\_cons | 19.94872 1.019394 19.57 0.000 17.9477 21.94973

------------------------------------------------------------------------------

.

. // Problem 5

. use "/Users/Jeremy/Documents/GitHub/ECN140-HW6/Datasets/INJURY.DTA", clear

.

. // part b

. sum durat if highearn == 1 & afchnge == 0 // High earners before

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

durat | 1,472 11.76155 30.01366 .25 182

. sum durat if highearn == 1 & afchnge == 1 // high earners after

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

durat | 1,380 13.93152 30.39186 .25 182

. sum durat if highearn == 0 & afchnge == 0 // low earners before

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

durat | 2,294 7.475044 17.25335 .25 182

. sum durat if highearn == 0 & afchnge == 1 // low earners after

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

durat | 2,004 8.611527 21.9445 .25 182

.

. // part c

. reg durat highearn afchnge afhigh

Source | SS df MS Number of obs = 7,150

-------------+---------------------------------- F(3, 7146) = 24.88

Model | 44343.4979 3 14781.166 Prob > F = 0.0000

Residual | 4245982.66 7,146 594.176136 R-squared = 0.0103

-------------+---------------------------------- Adj R-squared = 0.0099

Total | 4290326.16 7,149 600.129551 Root MSE = 24.376

------------------------------------------------------------------------------

durat | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

highearn | 4.286505 .8140426 5.27 0.000 2.690741 5.88227

afchnge | 1.136483 .7453242 1.52 0.127 -.3245728 2.597539

afhigh | 1.033489 1.178865 0.88 0.381 -1.277435 3.344414

\_cons | 7.475044 .5089333 14.69 0.000 6.477384 8.472704

------------------------------------------------------------------------------

.

.

end of do-file

. log close

name: <unnamed>

log: /Users/Jeremy/Documents/GitHub/ECN140-HW6/Final/Problem Set 6.log

log type: text

closed on: 1 Jun 2016, 22:06:47

-----------------------------------------------------------------------------------------