**Panel Econometrics**

Assignment #5

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# Question 1: Print out descriptive statistics (mean and standard deviation) of the raw variables and the created variables.

Table 1: Summary Statistics

|  |  |  |
| --- | --- | --- |
|  | (1) |  |
|  | mean | sd |
| price | 68.69993 | 41.98626 |
| pop | 4537.113 | 4828.836 |
| pop16 | 3366.616 | 3641.847 |
| cpi | 73.59667 | 36.52933 |
| ndi | 7525.023 | 4747.859 |
| sales | 123.9509 | 30.99105 |
| pimin | 62.89928 | 38.32313 |
| lnc | 5.23227 | .6054225 |
| lnclag | 5.266399 | .5854589 |
| lnp | 4.498752 | .1517772 |
| lny | 9.150421 | .2099475 |
| lnpn | 4.410703 | .1511349 |
| *N* | 1380 |  |

Created variables: lnc lnclag lnp lny lnpn

# Question 2: Replicate the results of Table 8.1

Table 2.1: Replication of Table 8.1 (1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
|  | OLS | Within | TSLS | TSLSKR | Within2SLS |
| lnclag | 1.013\*\*\* | 0.830\*\*\* | 1.047\*\*\* | 1.014\*\*\* | 0.568\*\*\* |
|  | (0.00252) | (0.0126) | (0.00719) | (0.00307) | (0.0357) |
| lnp | 0.00410 | -0.292\*\*\* | 0.0252 | -0.267\*\*\* | -0.517\*\*\* |
|  | (0.0144) | (0.0231) | (0.0159) | (0.0289) | (0.0388) |
| lny | -0.0616\*\*\* | 0.107\*\*\* | -0.0219\* | -0.0951\*\*\* | 0.228\*\*\* |
|  | (0.00710) | (0.0233) | (0.0109) | (0.0143) | (0.0309) |
| lnpn | 0.0791\*\*\* | 0.0355 | 0.0942\*\*\* | 0.387\*\*\* | -0.0141 |
|  | (0.0141) | (0.0266) | (0.0153) | (0.0286) | (0.0314) |

Table 2.2: Replication of Table 8.1 (2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
|  | FD2SLS | FD2SLSKR | GMM1Step | GMM2Step |
| lnclag |  |  | 0.833\*\*\* | 0.724\*\*\* |
|  |  |  | (0.0285) | (0.147) |
| lnp |  |  | -0.370\*\*\* | -0.405\*\*\* |
|  |  |  | (0.0427) | (0.0437) |
| lny |  |  | 0.134\* | 0.271 |
|  |  |  | (0.0612) | (0.260) |
| lnpn |  |  | -0.0278 | -0.0492 |
|  |  |  | (0.0585) | (0.0500) |
| D.lnclag | 0.241\*\*\* |  |  |  |
|  | (0.0614) |  |  |  |
| LD.lnc |  | 0.252\*\*\* |  |  |
|  |  | (0.0201) |  |  |
| D.lnp | -0.391\*\*\* | -0.227\*\*\* |  |  |
|  | (0.0272) | (0.0421) |  |  |
| D.lny | 0.199\*\*\* | 0.698\*\*\* |  |  |
|  | (0.0440) | (0.0410) |  |  |
| D.lnpn | -0.00434 | 0.186\*\*\* |  |  |
|  | (0.0353) | (0.0417) |  |  |

# Question 3: OLS vs. xtabond2

Table 3: OLS vs. xtabond2

|  |  |  |  |
| --- | --- | --- | --- |
|  | (1) | (2) | (3) |
|  | OLS | GMM1Step | GMM2Step |
| lnclag | 0.963\*\*\* | 0.833\*\*\* | 0.724\*\*\* |
|  | (0.00599) | (0.0285) | (0.147) |
| lnp | -0.122\*\*\* | -0.370\*\*\* | -0.405\*\*\* |
|  | (0.0151) | (0.0427) | (0.0437) |
| lny | -0.0118 | 0.134\* | 0.271 |
|  | (0.00775) | (0.0612) | (0.260) |
| lnpn | 0.0341\*\* | -0.0278 | -0.0492 |
|  | (0.0131) | (0.0585) | (0.0500) |

After adding all the year dummies into OLS, the difference between OLS and xtabond2 estimation becomes smaller.

# Question 4: FE vs. RE

Table 4: FE vs. RE

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
|  | FE | RE |
| lnclag | 0.830\*\*\* | 0.963\*\*\* |
|  | (0.0126) | (0.00599) |
| lnp | -0.292\*\*\* | -0.122\*\*\* |
|  | (0.0231) | (0.0151) |
| lny | 0.107\*\*\* | -0.0118 |
|  | (0.0233) | (0.00775) |
| lnpn | 0.0355 | 0.0341\*\* |
|  | (0.0266) | (0.0131) |

There is huge difference between RE and FE models.

# Question 5: 2SLS (ivregress), FE-2SLS and RE-2SLS (xtivreg) vs. Q3 and Q4

Table 5: 2SLS (ivregress), FE-2SLS and RE-2SLS (xtivreg)

|  |  |  |  |
| --- | --- | --- | --- |
|  | (1) | (2) | (3) |
|  | 2SLS | FE-2SLS | RE-2SLS |
| lnclag | 0.586\*\*\* | 0.568\*\*\* | 0.586\*\*\* |
|  | (0.0589) | (0.0357) | (0.0596) |
| lnp | -0.576\*\*\* | -0.517\*\*\* | -0.576\*\*\* |
|  | (0.0756) | (0.0388) | (0.0765) |
| lny | 0.212\*\*\* | 0.228\*\*\* | 0.212\*\*\* |
|  | (0.0375) | (0.0309) | (0.0380) |
| lnpn | 0.0837\*\* | -0.0141 | 0.0837\*\* |
|  | (0.0271) | (0.0314) | (0.0275) |

IV results are close to each other, comparing to the results in Q3 and Q4.

# Question 6: xtdpdsys vs. xtabond, comparing to FE and RE?

Table 6: xtdpdsys vs. xtabond, comparing to FE and RE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) |
|  | xtdpdsys | GMM-1-Step | GMM-2-Step | FE | RE |
| lnclag |  | 0.833\*\*\* | 0.724\*\*\* | 0.830\*\*\* | 0.963\*\*\* |
|  |  | (0.0285) | (0.147) | (0.0126) | (0.00599) |
| L.lnc | 0.746 |  |  |  |  |
|  | (11.57) |  |  |  |  |
| lnp | -0.388 | -0.370\*\*\* | -0.405\*\*\* | -0.292\*\*\* | -0.122\*\*\* |
|  | (1.207) | (0.0427) | (0.0437) | (0.0231) | (0.0151) |
| lny | 0.411 | 0.134\* | 0.271 | 0.107\*\*\* | -0.0118 |
|  | (15.72) | (0.0612) | (0.260) | (0.0233) | (0.00775) |
| lnpn | -0.0166 | -0.0278 | -0.0492 | 0.0355 | 0.0341\*\* |
|  | (4.250) | (0.0585) | (0.0500) | (0.0266) | (0.0131) |

The estimation from xtdpdsys is hugely different from all the other models, in terms of the scale of coefficients and their significance.

# Question 7: use xtdpd to replicate xtabond2

Table 7: Use xtdpd to replicate xtabond

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
|  | xtdpd | GMM2Step |
| lnclag |  | 0.724\*\*\* |
|  |  | (0.147) |
| L.lnc | 0.976 |  |
|  | (9.326) |  |
| lnp | -0.360 | -0.405\*\*\* |
|  | (6.573) | (0.0437) |
| lny | 0.189 | 0.271 |
|  | (27.49) | (0.260) |
| lnpn | -0.0527 | -0.0492 |
|  | (7.262) | (0.0500) |

I am not able to replicate xtabond2 using xtdpd. There might be significance mistake in my estimation in xtdpd model.

# Question 8: dgmmiv(lnp lny lnpn, lag(1 )) and dgmmiv(lnp lny lnpn, lag(1 1))

Table 8: dgmmiv(lnp lny lnpn,lag(1 .)) and dgmmiv(lnp lny lnpn,lag(1 1))

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
|  | AB-Option1 | AB-Option2 |
| L.lnc | 0.717 | 0.853 |
|  | (.) | (0.797) |
| lnp | -1.149 | -0.902 |
|  | (.) | (3.037) |
| lny | 0.0513 | -0.0897 |
|  | (.) | (2.005) |
| lnpn | -0.474 | 0.251 |
|  | (.) | (1.461) |

My estimation for dgmmiv(lnp lny lnpn, lag(1 .)) failed because STATA fails to estimate standard errors.

# Question 9: lgmmiv(lnc) and lgmmiv(lnc lnp lny lnpn)

Table 9: lgmmiv(lnc) and lgmmiv(lnc lnp lny lnpn)

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
|  | AB-Option3 | AB-Option4 |
| L.lnc | 0.900 | 0.702 |
|  | (4.375) | (0.638) |
| lnp | -0.623 | -0.985 |
|  | (20.38) | (1.744) |
| lny | 0.117 | -0.192 |
|  | (6.001) | (1.878) |
| lnpn | -0.0897 | -0.324 |
|  | (12.44) | (2.236) |

Option 3 implements a system GMM instrumenting the level equation with differences of the dependent variable. Option 4 instruments the level using differences of all the regressors.

# Question 10: which model do I prefer?

1. To take into consideration of lagged dependent variable, we can definitely discard OLS, FE and RE estimator.
2. For efficiency, we might discard 2SLS, FE-2SLS and RE-2SLS because their error term structure is not taken into account. Also, it is hard to think that these instruments are consistent.
3. Therefore, I prefer the robust Arellano-Bond using Windmeijer model, or system GMM?