Assignment 1
Advanced Econometrics 1

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October 3, 2017

1 Introduction

In this assignment we investigate the behavior of the Hausman endogeneity test using Monte Carlo simulation. We try to simulate the impact of the true underlying parameters on our $\hat{\beta}_{OLS}$ and $\hat{\beta}_{2SLS}$ estimators and their variance.

2 Simulation

In our simulation we vary the parameters ρ, γ and π_1 and investigate their impact on our estimators and thus also on the Hausman test. We also vary the number of instruments and observations to investigate the impact of these parameters. Lastly we keep σ_z and number of iterations per Monte Carlo simulation constant at 2 and 10000, respectively.

2.1 Part 1 - γ and $\rho = 0$

In the first part of our simulations we fix both γ and ρ to be zero and thus ensure that both $\hat{\beta}_{OLS}$ and $\hat{\beta}_{2SLS}$ are consistent. We look at the results of these tests

2.2 Part 2 - $\gamma = 0$ and $\rho \neq 0$

2.3 Part 3 - γ and $\rho \neq 0$

3 Conclusion

4 to be deleted

4.1 $r = 3, N = 50, \rho = 0, \gamma = 0, \pi_1 = 0.5$

The Hausman test passed the critical value 575 times out of 10000 iterations The average concentration parameter is 24.984845

NEGATIVE VALUES

4.2 $r = 3, N = 200, \rho = 0, \gamma = 0, \pi_1 = 0.5$

The Hausman test passed the critical value 543 times out of 10000 iterations The average concentration parameter is 100.0274391

4.3 $r = 1, N = 200, \rho = 0, \gamma = 0, \pi_1 = 0.5$

The Hausman test passed the critical value 516 times out of 10000 iterations The average concentration parameter is 99.8943921

4.4 $r = 5, N = 200, \rho = 0, \gamma = 0, \pi_1 = 0.5$

The Hausman test passed the critical value 522 times out of 10000 iterations The average concentration parameter is 99.8181302

4.5 $r = 3, N = 200, \rho = 0, \gamma = 0, \pi_1 = 0.1$

The Hausman test passed the critical value 86 times out of 10000 iterations The average concentration parameter is 3.9972102

5   part 2

5.1 $r = 3, N = 200, \rho = 0.25, \gamma = 0, \pi_1 = 0.1$

The Hausman test passed the critical value 131 times out of 10000 iterations The average concentration parameter is 3.9908842

5.2 $r = 3, N = 200, \rho = 0.25, \gamma = 0, \pi_1 = 0.25$

The Hausman test passed the critical value 1703 times out of 10000 iterations The average concentration parameter is 24.9864017

5.3 $r = 3, N = 200, \rho = 0.25, \gamma = 0, \pi_1 = 0.5$

The Hausman test passed the critical value 5187 times out of 10000 iterations The average concentration parameter is 99.9926444

5.4 $r = 3, N = 200, \rho = 0.5, \gamma = 0, \pi_1 = 0.1$

The Hausman test passed the critical value 378 times out of 10000 iterations The average concentration parameter is 4.0031372

5.5 $r = 3, N = 200, \rho = 0.5, \gamma = 0, \pi_1 = 0.25$

The Hausman test passed the critical value 6564 times out of 10000 iterations The average concentration parameter is 25.0154405

5.6 $r = 3, N = 200, \rho = 0.5, \gamma = 0, \pi_1 = 0.5$

The Hausman test passed the critical value 9936 times out of 10000 iterations The average concentration parameter is 100.0195835

5.7 $r = 3, N = 200, \rho = 0.5, \gamma = 0, \pi_1 = 0.38$

The Hausman test passed the critical value 9494 times out of 10000 iterations The average concentration parameter is 57.7446713

5.8 $r = 3, N = 100, \rho = 0.5, \gamma = 0, \pi_1 = 0.38$

The Hausman test passed the critical value 6536 times out of 10000 iterations The average concentration parameter is 28.9053636

5.9 $r = 10, N = 200, \rho = 0.5, \gamma = 0, \pi_1 = 0.381$

The Hausman test passed the critical value 9186 times out of 10000 iterations The average concentration parameter is 57.6315294

6   section where $\gamma \neq 0$

6.1 $r = 3, N = 200, \rho = 0.25, \gamma = 0.1, \pi_1 = 01$

The Hausman test passed the critical value 218 times out of 10000 iterations The average concentration parameter is 3.9974141

6.2 $r = 3, N = 200, \rho = 0.25, \gamma = 0.1, \pi_1 = 0.25$

The Hausman test passed the critical value 515 times out of 10000 iterations The average concentration parameter is 24.9959808

6.3 $r = 3, N = 200, \rho = 0.25, \gamma = 0.1, \pi_1 = 0.5$

The Hausman test passed the critical value 2381 times out of 10000 iterations The average concentration parameter is 100.0160789

7   table

simulation	r	N	ρ	γ	π_1
1	3	50	0	0	0.5
2	3	200	0	0	0.5
3	1	200	0	0	0.5
4	5	200	0	0	0.5
5	3	200	0	0	0.1
6	3	200	0.25	0	0.1
7	3	200	0.25	0	0.25
8	3	200	0.25	0	0.5
9	3	200	0.5	0	0.1
10	3	200	0.5	0	0.25
11	3	200	0.5	0	0.5
12	3	200	0.5	0	0.38
13	3	100	0.5	0	0.38
14	10	200	0.5	0	0.38
15	3	200	0.25	0.1	0.1
16	3	200	0.25	0.1	0.25
17	3	200	0.25	0.1	0.5