Homework 2

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1 Part 1

- . program genest
 - drop _all
 - 2. set obs 50
 - 3. gen eps = rnormal()
 - 4. gen x = 3 + 2*rnormal()
 - 5. gen y = -2 + 1.5*x + eps
 - 6. regress y x
 - 7. end

2 Part 2

Below is the output

. genest number of observations ($_{\text{L}}N$) was 0, now 50

Source SS df MS Number of obs =	
Model 324.356864	94.26 0000 8598 8568 0499

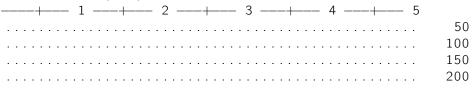
у	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
					1.284044 -2.497084	

3 Part 3

- . set seed 1
- . simulate est = $_{b}[x]$ se = $_{se}[x]$, reps(200): genest

command: genest est: $_{b}[x]$ se: $_{se}[x]$

Simulations (200)



. summarize

Variable	Obs	Mean	Std. Dev.	. Min	Max
est	200	1.506635	.0726041	1.26415	1.705211
se	200	.0720119	.0104828	.0484777	.1050481

Using the output we can answer the questions

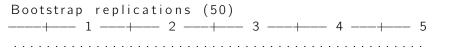
- (a) The average is 1.5066 with a deviation of 0.0726
- (b) The average standard error is 0.0720
- (c) They are roughly the same

4 Part 4

- . program genestboot
 - 1. drop _all
 - 2. set obs 50
 - 3. gen eps = rnormal()
 - 4. gen x = 3 + 2*rnormal()
 - 5. gen y = -2 + 1.5*x + eps
 - 6. regress y x, vce(bootstrap)
 - 7. end

5 Part 5

. genestboot
number of observations (_N) was 0, now 50
(running regress on estimation sample)



Linear 50	regression	Number of obs	=
50		Replications	=
		Wald chi2(1)	=
		Prob > chi2	=

50

713.00

0.0000

R—squared	=	0.9051
Adj R-squared	=	0.9031
Root MSE	=	1.0001

у	'	Bootstrap Std. Err.	Z	P> z		—based Interval]
X _cons		.0603361 .2148256	26.70 -10.97	0.000	1.492847 -2.77707	1.72936 -1.93497

6 Part 6

. set seed 1

. simulate estboot = $_{b}[x]$ seboot = $_{se}[x]$, reps(200): genestboot

command: genestboot

 $estboot: _b[x]$ $seboot: _se[x]$

Simulations (200)

+	1 2	2+ 3+ 5	
			50
			100
			150
			200

. summarize

Variable	Obs	Mean	Std. Dev.	. Min	Max
estboot	200	1.495849	.069865	1.315208	1.722901
seboot	200	.0712221	.0156659	.0399135	.1229222

Using the output we can answer the questions

- (a) The average is 1.4958. It is very close to the average from question 3 because the random variable was generated using the same procedure. As a result, it has the same expected value.
- (b) The standard deviation is 0.6987 and the average of the bootstrap standard errors is 0.0712.
- (c) They are roughly the same

7 Part 7

- . program genestiv
 - 1. drop _all
 - 2. set obs 50
 - 3. matrix $C = (1, .1 \setminus .1, 1)$
 - 4. drawnorm eps1 eps2, n(50) corr(C)
 - 5. gen z = rnormal(0, sqrt(3))

- 6. gen x = 3 + z + eps1
- 7. gen y = -2 + 1.5*x + eps2
- 8. ivregress 2sls y (x = z)
- 9. end

8 Part 8

. genestiv

number of observations (_N) was 0, now 50

Instrumental variables (2SLS) regression 50

Number of obs =

у	Coef.	Std. Err.	Z	P> z	[95% Conf.	Interval]
	1.52849 -2.052174				1.380686 -2.542706	1.0.0200

Instrumented: x
Instruments: z

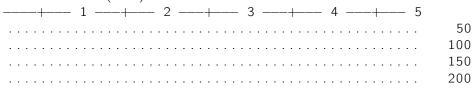
9 Part 9

. set seed 1

. simulate estiv = $_{b}[x]$ seiv = $_{se}[x]$, reps(200): genestiv

command: genestiv
 estiv: _b[x]
 seiv: _se[x]

Simulations (200)



. summarize

Variable	Obs	Mean	Std. Dev.	Min	Max
estiv	200	1.495105	.0826352	1.231686	1.73896
seiv	200	.0827737	.0147824	.0481943	.1465963

- (a) The average is 1.4951. The standard deviation is 0.0826
- (b) The standard error's average is 0.08277

(c) They are roughly the same.

10 Part 10

- . program genestivboot
 - 1. drop _all
 - 2. set obs 50
 - 3. matrix $C = (1, .1 \setminus .1, 1)$
 - 4. drawnorm eps1 eps2, n(50) corr(C)
 - 5. gen z = rnormal(0, sqrt(3))
 - 6. gen x = 3 + z + eps1
 - 7. gen y = -2 + 1.5*x + eps2
 - 8. ivregress 2sls y (x = z), vce(bootstrap)
 - 9. end

11 Part 11

. genestivboot number of observations (_N) was 0, now 50 (running ivregress on estimation sample)



R-squared = 0.0000Root MSE = 0.0000

у	!	Bootstrap Std. Err.	Z	P> z		<pre>-based Interval]</pre>
	1.362522 -1.892268		15.38 -7.79		1.188938 -2.368501	

Instrumented: x
Instruments: z

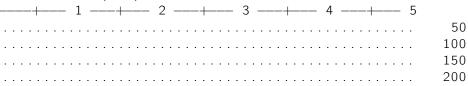
12 Part 12

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. set seed 1
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. simulate estivboot = $_{-}b[x]$ seivboot = $_{-}se[x]$, reps(200): genestivboot command: genestivboot

estivboot: _b[x]
seivboot: _se[x]

Simulations (200)



. summarize

Variable	Obs	Mean	Std. Dev.	Min	Max
estivboot	200	1.489636	.0865869	1.277416	1.69758
seivboot	200	.0861209	.0219406	.0393325	.194288

- (a) The average is 1.489. It is very close to the average from question 9 because the random variable was generated using the same procedure. As a result, it has the same expected value.
- (b) The standard deviation is 0.0865 and the average of the bootstrap standard errors is 0.0861.
- (c) They are roughly the same