

Demand and Supply Equations

$$\ln S_t = \beta_{10} + \beta_{11} \ln P_{Dt} + \beta_{12} \ln P_{X2t} + \beta_{13} \ln P_{X3t} + \beta_{14} \ln P_{X4t} + \varepsilon_{1t} \quad (1)$$

$$\ln D_t = \beta_{20} + \beta_{21} \ln P_{Dt} + \beta_{22} \ln GDP_t + \varepsilon_{2t} \quad (2)$$

Equilibrium condition can be achieved by $D_t = S_t$ through the price P_{Dt} mechanism.

where: S_t = Domestic Supply at time t

D_t = Domestic Demand at time t

P_{Dt} = Domestic Price at time $t = P_{Mt} + T_t$

T_t = Tariff at time t

P_{X2t} = Price of Input 2 at time t

P_{X3t} = Price of Input 3 at time t

P_{X4t} = Price of Input 4 at time t

GDP_t = Gross Domestic Product (Representing Income) at time t

Endogenous variables in this system include S_t , D_t , and P_{Dt}

Exogenous variables in this system include P_{X2t} , P_{X3t} , P_{X4t} , and GDP_t

- a. State reduce form models of this system. Estimate reduce form models using OLS and prediction of the endogenous variables.

$$D_t = S_t \Rightarrow \ln D_t = \ln S_t$$

$$\beta_{20} + \beta_{21} \ln P_{Dt} + \beta_{22} \ln GDP_t + \varepsilon_{2t} = \beta_{10} + \beta_{11} \ln P_{Dt} + \beta_{12} \ln P_{X2t} + \beta_{13} \ln P_{X3t} + \beta_{14} \ln P_{X4t} + \varepsilon_{1t}$$

$$\beta_{21} \ln P_{Dt} - \beta_{11} \ln P_{Dt} = \beta_{10} - \beta_{20} + \beta_{12} \ln P_{X2t} + \beta_{13} \ln P_{X3t} + \beta_{14} \ln P_{X4t} - \beta_{22} \ln GDP_t + \varepsilon_{1t} - \varepsilon_{2t}$$

$$(\beta_{21} - \beta_{11}) \ln P_{Dt} = \beta_{10} - \beta_{20} + \beta_{12} \ln P_{X2t} + \beta_{13} \ln P_{X3t} + \beta_{14} \ln P_{X4t} - \beta_{22} \ln GDP_t + \varepsilon_{1t} - \varepsilon_{2t}$$

$$\ln P_{Dt} = \frac{\beta_{10} - \beta_{20}}{\beta_{21} - \beta_{11}} + \frac{\beta_{12} \ln P_{X2t}}{\beta_{21} - \beta_{11}} + \frac{\beta_{13} \ln P_{X3t}}{\beta_{21} - \beta_{11}} + \frac{\beta_{14} \ln P_{X4t}}{\beta_{21} - \beta_{11}} - \frac{\beta_{22} \ln GDP_t}{\beta_{21} - \beta_{11}} + \frac{\varepsilon_{1t} - \varepsilon_{2t}}{\beta_{21} - \beta_{11}}$$

$$\ln P_{Dt} = \pi_0 + \pi_1 \ln P_{X2t} + \pi_2 \ln P_{X3t} + \pi_3 \ln P_{X4t} + \pi_4 \ln GDP_t + w_t$$

where $\pi_0 = \frac{\beta_{10} - \beta_{20}}{\beta_{21} - \beta_{11}}$ $\pi_1 = \frac{\beta_{12}}{\beta_{21} - \beta_{11}}$ $\pi_2 = \frac{\beta_{13}}{\beta_{21} - \beta_{11}}$ $\pi_3 = \frac{\beta_{14}}{\beta_{21} - \beta_{11}}$ $\pi_4 = \frac{-\beta_{22}}{\beta_{21} - \beta_{11}}$ $w_t = \frac{\varepsilon_{1t} - \varepsilon_{2t}}{\beta_{21} - \beta_{11}}$

$$\ln P_{Dt} = 2.876516 + 0.1319015 \ln P_{X2t} + 0.0939843 \ln P_{X3t} + 0.493964 \ln P_{X4t} + 0.1639781 \ln GDP_t$$

- b. Estimate structural form using predicted endogenous variables as independent variables in the structural form models.

$$\ln S_t = \beta_0 + \beta_{11} \ln P_{Dt} + \beta_{12} \ln P_{X2t} + \beta_{13} \ln P_{X3t} + \beta_{14} \ln P_{X4t} + \varepsilon_{1t}$$

$$= 8.59916 + 3.873476 \ln P_{Dt} - 0.777963 \ln P_{X2t} - 1.171146 \ln P_{X3t} - 1.428771 \ln P_{X4t}$$

$$\ln D_t = 35.93498 - 2.574157 \ln P_{Dt} + 0.5212927 \ln GDP_t$$

- c. Estimate this system equations model using OLS, 2SLS, 3SLS, and I3SLS. Determine whether there exists endogeneity bias in the estimated results. Concerning on the asymptotic property, which model is the most appropriated model? Why? What do β_{21} and β_{22} mean?

$\text{Prob} > \chi^2_4 = 0.5659$ It failed to reject H_0 which means there is no endogeneity bias. The most appropriated is OLS as s.d. of OLS is the lowest among other method.

β_{21} means when P_{Dt} increase by 1%, D_t will decrease by $\beta_{21}\%$.

β_{22} means when GDP increase by 1%, D_t will increase by $\beta_{22}\%$.

Additional Issue:

If equilibrium doesn't hold $D_i \neq S_i$, when $D_i > S_i$; then $Q_i = S_i$ but when $D_i < S_i$; then $Q_i = D_i$, where Q_i is transaction quantity at time t .

$$\ln Q_t = \beta_{10} + \beta_{11} \ln P_{Dt} + \beta_{12} \ln P_{X2t} + \beta_{13} \ln P_{X3t} + \beta_{14} \ln P_{X4t} + \varepsilon_{1t} \quad (3)$$

$$\ln Q_t = \beta_{20} + \beta_{21} \ln P_{Dt} + \beta_{22} \ln GDP_t + \varepsilon_{2t} \quad (4)$$

- d. Generate $\ln Q_t$ and estimate the above system equations (model (3) and model (4)) using OLS, 2SLS, and 3SLS using Q_t , and P_{Dt} as endogenous variables and P_{X2t} , P_{X3t} , P_{X4t} , and GDP_t as exogenous variables.

OLS

$$\ln Q_t = 40.10218 - 1.353506 \ln P_{Dt} - .3864994 \ln P_{X2t} - 0.6782817 \ln P_{X3t} - 0.3606189 \ln P_{X4t}$$

$$\ln Q_t = 31.03578 - 2.181329 \ln P_{Dt} + 0.5776586 \ln GDP_t$$

2SLS

$$\ln Q_t = 24.95604 + 0.7752765 \ln P_{Dt} - 0.5909191 \ln P_{X2t} - 0.7971771 \ln P_{X3t} - 0.9608797 \ln P_{X4t}$$

$$\ln Q_t = 35.93499 - 2.574157 \ln P_{Dt} + 0.5212921 \ln GDP_t$$

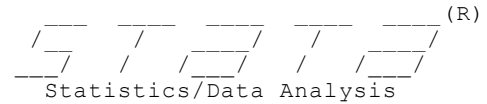
3SLS

$$\ln Q_t = 24.81121 + 0.7879239 \ln P_{Dt} - 0.6046439 \ln P_{X2t} - 0.8372831 \ln P_{X3t} - 0.9111679 \ln P_{X4t}$$

$$\ln Q_t = 35.93499 - 2.574157 \ln P_{Dt} + 0.5212921 \ln GDP_t$$

- e. What are the problems, in term of economic concept and econometric technique, of the estimated results in d?

The problems are the biased even though it is consistent and asymptotically efficient



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name: <unnamed>
log: C:\Users\Pongpanot\Downloads\assignment 2 mat.smcl
log type: smcl
opened on: 4 Feb 2021, 00:28:24
    
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1 . use "C:\Users\Pongpanot\Downloads\assign2.dta", clear
2 . gen lnst = ln(st)
3 . gen lndt = ln(dt)
4 . gen lnpd = ln(pm+t)
5 . gen lnp2 = ln(px2)
6 . gen lnp3 = ln(px3)
7 . gen lnp4 = ln(px4)
8 . gen lngdp = ln(gdp)
9 . reg lnpd lnp2 lnp3 lnp4 lngdp
    
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Source	SS	df	MS	Number of obs	=	22
Model	.17707359	4	.044268398	F(4, 17)	=	6.76
Residual	.111247189	17	.006543952	Prob > F	=	0.0019
				R-squared	=	0.6142
				Adj R-squared	=	0.5234
Total	.288320779	21	.013729561	Root MSE	=	.08089

lnpd	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnp2	.1318015	.0695123	1.90	0.075	-.0148567 .2784596
lnp3	.0939842	.127627	0.74	0.472	-.1752851 .3632535
lnp4	.4939641	.1936093	2.55	0.021	.0854842 .9024439
lngdp	.1632779	.0877392	1.86	0.080	-.0218357 .3483914
_cons	2.87652	2.434717	1.18	0.254	-2.260283 8.013322

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10 . predict lnpdhat
    (option xb assumed; fitted values)
    
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11 . reg lnst lnpd lnp2 lnp3 lnp4
    
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Source	SS	df	MS	Number of obs	=	22
Model	4.71070935	4	1.17767734	F(4, 17)	=	43.14
Residual	.464092568	17	.027299563	Prob > F	=	0.0000
				R-squared	=	0.9103
				Adj R-squared	=	0.8892
Total	5.17480192	21	.246419139	Root MSE	=	.16523

lnst	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnpd	-1.111835	.4515147	-2.46	0.025	-2.064448 -.1592222
lnp2	-.4189546	.1431634	-2.93	0.009	-.7210029 -.1169063
lnp3	-.9424196	.2585266	-3.65	0.002	-1.487863 -.3969762
lnp4	-.521346	.3441643	-1.51	0.148	-1.247469 .2047773
_cons	41.4946	3.661911	11.33	0.000	33.76865 49.22056

12 . reg lndt lnpd lngdp

Source	SS	df	MS	Number of obs	=	22
Model	3.58210899	2	1.79105449	F(2, 19)	=	92.53
Residual	.367764099	19	.019356005	Prob > F	=	0.0000
				R-squared	=	0.9069
				Adj R-squared	=	0.8971
Total	3.94987309	21	.188089195	Root MSE	=	.13913

lndt	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnpd	-2.181329	.2946999	-7.40	0.000	[-2.798143 -1.564515]
lngdp	.5776586	.0887536	6.51	0.000	 [.3918952 .7634221]
_cons	31.03578	3.761201	8.25	0.000	 [23.1635 38.90807]

13 . reg lnpdhat lnp2 lnp3 lnp4 lngdp

Source	SS	df	MS	Number of obs	=	22
Model	.177073431	4	.044268358	F(4, 17)	>	99999.00
Residual	1.0239e-12	17	6.0232e-14	Prob > F	=	0.0000
				R-squared	=	1.0000
				Adj R-squared	=	1.0000
Total	.177073431	21	.008432068	Root MSE	=	2.5e-07

lnpdhat	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnp2	.1318015	2.11e-07	6.2e+05	0.000	 [.131801 .1318019]
lnp3	.0939843	3.87e-07	2.4e+05	0.000	 [.0939835 .0939852]
lnp4	.493964	5.87e-07	8.4e+05	0.000	 [.4939628 .4939653]
lngdp	.1632781	2.66e-07	6.1e+05	0.000	 [.1632776 .1632787]
_cons	2.876516	7.39e-06	3.9e+05	0.000	 [2.876501 2.876532]

14 . reg lnt lnpdhat lnpd lnp2 lnp3 lnp4

Source	SS	df	MS	Number of obs	=	22
Model	4.99318948	5	.998637895	F(5, 16)	=	87.98
Residual	.181612443	16	.011350778	Prob > F	=	0.0000
				R-squared	=	0.9649
				Adj R-squared	=	0.9539
Total	5.17480192	21	.246419139	Root MSE	=	.10654

lnt	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnpdhat	3.873476	.7764611	4.99	0.000	 [2.227452 5.5195]
lnpd	-1.76737	.3194244	-5.53	0.000	 [-2.44452 -1.090221]
lnp2	-.7279623	.1111697	-6.55	0.000	 [-.9636316 -.492293]
lnp3	-1.122146	.1705504	-6.58	0.000	 [-1.483697 -.7605956]
lnp4	-1.428719	.286937	-4.98	0.000	 [-2.036999 -.82044]
_cons	18.59916	5.161325	3.60	0.002	 [7.657644 29.54068]

15 . reg lnst lnpdhat lnpx2 lnpx3 lnpx4

Source	SS	df	MS	Number of obs	=	22
Model	4.64569773	4	1.16142443	F(4, 17)	=	37.32
Residual	.529104183	17	.031123775	Prob > F	=	0.0000
Total	5.17480192	21	.246419139	R-squared	=	0.8978
				Adj R-squared	=	0.8737
				Root MSE	=	.17642

lnst	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnpdhat	2.106112	1.171903	1.80	0.090	-.3663879 4.578612
lnpx2	-.727963	.1840856	-3.95	0.001	-1.11635 -.3395762
lnpx3	-1.122146	.2824139	-3.97	0.001	-1.717988 -.5263052
lnpx4	-1.428722	.4751381	-3.01	0.008	-2.431176 -.4262679
_cons	18.59912	8.546622	2.18	0.044	.5673274 36.63092

16 . reg lndt lnpdhat lngdp

Source	SS	df	MS	Number of obs	=	22
Model	3.26129847	2	1.63064924	F(2, 19)	=	44.99
Residual	.688574614	19	.036240769	Prob > F	=	0.0000
Total	3.94987309	21	.188089195	R-squared	=	0.8257
				Adj R-squared	=	0.8073
				Root MSE	=	.19037

lndt	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnpdhat	-2.574157	.5697943	-4.52	0.000	-3.76675 -1.381563
lngdp	.5212927	.1344816	3.88	0.001	.2398194 .802766
_cons	35.93498	7.189835	5.00	0.000	20.88648 50.98347

17 . reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), ols

Multivariate regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
lnst	22	4	.1652258	0.9103	43.14	0.0000
lndt	22	2	.1391259	0.9069	92.53	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnst					
lnpd	-1.111835	.4515147	-2.46	0.019	-2.027549 -.1961207
lnpx2	-.4189546	.1431634	-2.93	0.006	-.7093034 -.1286059
lnpx3	-.9424196	.2585266	-3.65	0.001	-1.466736 -.4181034
lnpx4	-.521346	.3441643	-1.51	0.139	-1.219344 .1766516
_cons	41.4946	3.661911	11.33	0.000	34.0679 48.9213
lndt					
lnpd	-2.181329	.2946999	-7.40	0.000	-2.779008 -1.58365
lngdp	.5776586	.0887536	6.51	0.000	.397658 .7576593
_cons	31.03578	3.761201	8.25	0.000	23.40771 38.66385

18 . reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), 2sls nodfk inst(lnpx2 lnpx3 lnpx4 lngdp)

Two-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
lnst	22	4	.329951	0.6424	13.81	0.0000
lndt	22	2	.1454858	0.8982	89.20	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnst					
lnpd	2.10611	1.926677	1.09	0.282	-1.801371 6.013591
lnpx2	-.7279628	.3026471	-2.41	0.021	-1.34176 -.114166
lnpx3	-1.122146	.464304	-2.42	0.021	-2.063798 -.180494
lnpx4	-1.428722	.7811544	-1.83	0.076	-3.012977 .155325
_cons	18.59914	14.05113	1.32	0.194	-9.897873 47.09616
lndt					
lnpd	-2.574157	.4046743	-6.36	0.000	-3.394875 -1.75344
lngdp	.5212921	.0955104	5.46	0.000	.327588 .7149961
_cons	35.93499	5.106302	7.04	0.000	25.57893 46.29105

Endogenous variables: lnst lnpd lndt
 Exogenous variables: lnpx2 lnpx3 lnpx4 lngdp

19 . reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), 3sls inst(lnpx2 lnpx3 lnpx4 lngdp)

Three-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
lnst	22	4	.2963642	0.6266	57.47	0.0000
lndt	22	2	.135203	0.8982	178.41	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
lnst					
lnpd	2.171576	1.926095	1.13	0.260	-1.603501 5.946652
lnpx2	-.7990055	.2985983	-2.68	0.007	-1.384247 -.2137635
lnpx3	-1.329743	.4560002	-2.92	0.004	-2.223487 -.4359989
lnpx4	-1.171403	.775654	-1.51	0.131	-2.691657 .348851
_cons	17.84948	14.04122	1.27	0.204	-9.670808 45.36976
lndt					
lnpd	-2.574157	.4046743	-6.36	0.000	-3.367304 -1.78101
lngdp	.5212921	.0955104	5.46	0.000	.3340951 .708489
_cons	35.93499	5.106302	7.04	0.000	25.92682 45.94316

Endogenous variables: lnst lnpd lndt
 Exogenous variables: lnpx2 lnpx3 lnpx4 lngdp

20 . reg3 (lnst lnpd lnp2 lnp3 lnp4) (lndt lnpd lngdp), 3sls ireg3 inst(lnp2 lnp3 lnp4 lngdp)

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Iteration 1: tolerance = .1059484
Iteration 2: tolerance = .04569793
Iteration 3: tolerance = .01846611
Iteration 4: tolerance = .00725496
Iteration 5: tolerance = .00281814
Iteration 6: tolerance = .00108981
Iteration 7: tolerance = .00042072
Iteration 8: tolerance = .00016231
Iteration 9: tolerance = .0000626
Iteration 10: tolerance = .00002414
Iteration 11: tolerance = 9.310e-06
Iteration 12: tolerance = 3.590e-06
Iteration 13: tolerance = 1.384e-06
Iteration 14: tolerance = 5.339e-07
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Three-stage least-squares regression, iterated

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
lnst	22	4	.3022006	0.6117	54.83	0.0000
lndt	22	2	.135203	0.8982	178.41	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnst						
lnpd	2.212666	2.005956	1.10	0.270	-1.718936	6.144268
lnp2	-.8435967	.3049354	-2.77	0.006	-1.441259	-.2459342
lnp3	-1.460044	.4623671	-3.16	0.002	-2.366267	-.5538216
lnp4	-1.009892	.7998393	-1.26	0.207	-2.577548	.557764
_cons	17.37893	14.61488	1.19	0.234	-11.26571	46.02357
lndt						
lnpd	-2.574157	.4046743	-6.36	0.000	-3.367304	-1.78101
lngdp	.5212921	.0955104	5.46	0.000	.3340951	.708489
_cons	35.93499	5.106302	7.04	0.000	25.92682	45.94316

Endogenous variables: lnst lnpd lndt
 Exogenous variables: lnp2 lnp3 lnp4 lngdp

21 . hausman twostage ols
estimation result twostage not found
 r(111);

22 . reg3 (lnst lnpd lnp2 lnp3 lnp4) (lndt lnpd lngdp), ols

Multivariate regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
lnst	22	4	.1652258	0.9103	43.14	0.0000
lndt	22	2	.1391259	0.9069	92.53	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnst						
lnpd	-1.111835	.4515147	-2.46	0.019	-2.027549	-.1961207
lnpx2	-.4189546	.1431634	-2.93	0.006	-.7093034	-.1286059
lnpx3	-.9424196	.2585266	-3.65	0.001	-1.466736	-.4181034
lnpx4	-.521346	.3441643	-1.51	0.139	-1.219344	.1766516
_cons	41.4946	3.661911	11.33	0.000	34.0679	48.9213
lndt						
lnpd	-2.181329	.2946999	-7.40	0.000	-2.779008	-1.58365
lngdp	.5776586	.0887536	6.51	0.000	.397658	.7576593
_cons	31.03578	3.761201	8.25	0.000	23.40771	38.66385

23 . est store ols

24 . reg3 (lnst lnpd lnpx2 lnpx3 lnpx4) (lndt lnpd lngdp), 2sls nodfk inst(lnpx2 lnpx3 lnpx4 lngdp)

Two-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
lnst	22	4	.329951	0.6424	13.81	0.0000
lndt	22	2	.1454858	0.8982	89.20	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnst						
lnpd	2.10611	1.926677	1.09	0.282	-1.801371	6.013591
lnpx2	-.7279628	.3026471	-2.41	0.021	-1.34176	-.114166
lnpx3	-1.122146	.464304	-2.42	0.021	-2.063798	-.180494
lnpx4	-1.428722	.7811544	-1.83	0.076	-3.012977	.1555325
_cons	18.59914	14.05113	1.32	0.194	-9.897873	47.09616
lndt						
lnpd	-2.574157	.4046743	-6.36	0.000	-3.394875	-1.75344
lngdp	.5212921	.0955104	5.46	0.000	.327588	.7149961
_cons	35.93499	5.106302	7.04	0.000	25.57893	46.29105

Endogenous variables: lnst lnpd lndt

Exogenous variables: lnpx2 lnpx3 lnpx4 lngdp

25 . est store twostage

26 . hausman twostage ols

	Coefficients			
	(b) twostage	(B) ols	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnpd	2.10611	-1.111835	3.217945	1.873023
lnpx2	-.7279628	-.4189546	-.3090082	.266645
lnpx3	-1.122146	-.9424196	-.1797266	.3856712
lnpx4	-1.428722	-.521346	-.907376	.7012511

b = consistent under Ho and Ha; obtained from reg3
 B = inconsistent under Ha, efficient under Ho; obtained from reg3

Test: Ho: difference in coefficients not systematic

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chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =      2.95
Prob>chi2 =      0.5659
    
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27 . gen qt = dt if st>dt
28 . gen lnqt = ln(qt)
29 . reg3 (lnqt lnpd lnpx2 lnpx3 lnpx4) ( lnqt lnpd lngdp), ols
    
```

Multivariate regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
lnqt	22	4	.136235	0.9201	48.95	0.0000
2lnqt	22	2	.1391259	0.9069	92.53	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnqt						
lnpd	-1.353506	.3722912	-3.64	0.001	-2.108548	-.5984645
lnpx2	-.3864994	.1180437	-3.27	0.002	-.6259031	-.1470957
lnpx3	-.6782817	.2131651	-3.18	0.003	-1.110601	-.2459629
lnpx4	-.3606189	.2837767	-1.27	0.212	-.9361448	.2149069
_cons	40.10218	3.019386	13.28	0.000	33.97858	46.22578
2lnqt						
lnpd	-2.181329	.2946999	-7.40	0.000	-2.779008	-1.58365
lngdp	.5776586	.0887536	6.51	0.000	.397658	.7576593
_cons	31.03578	3.761201	8.25	0.000	23.40771	38.66385

```

30 . reg3 (lnqt lnpd lnpx2 lnpx3 lnpx4) ( lnqt lnpd lngdp), 2sls nodfk inst( lnpx2 lnpx3 lnpx4 lngdp)
    
```

Two-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
lnqt	22	4	.2329302	0.7665	20.29	0.0000
2lnqt	22	2	.1454858	0.8982	89.20	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnqt						
lnpd	.7752765	1.360145	0.57	0.572	-1.983225	3.533778
lnpx2	-.5909191	.2136549	-2.77	0.009	-1.024231	-.1576068
lnpx3	-.7971771	.3277773	-2.43	0.020	-1.46194	-.132414
lnpx4	-.9608797	.551459	-1.74	0.090	-2.079291	.1575311
_cons	24.95604	9.919453	2.52	0.016	4.838457	45.07362
2lnqt						
lnpd	-2.574157	.4046743	-6.36	0.000	-3.394875	-1.75344
lngdp	.5212921	.0955104	5.46	0.000	.327588	.7149961
_cons	35.93499	5.106302	7.04	0.000	25.57893	46.29105

Endogenous variables: lnqt lnpd
 Exogenous variables: lnpx2 lnpx3 lnpx4 lngdp

31 . reg3 (lnqt lnpd lnpx2 lnpx3 lnpx4) (lnqt lnpd lngdp), 3sls inst(lnpx2 lnpx3 lnpx4 lngdp)

Three-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
lnqt	22	4	.2056595	0.7644	81.74	0.0000
2lnqt	22	2	.135203	0.8982	178.41	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
lnqt					
lnpd	.7879239	1.360114	0.58	0.562	-1.877851 3.453699
lnpx2	-.6046439	.2134422	-2.83	0.005	-1.022983 -.1863049
lnpx3	-.8372831	.3273419	-2.56	0.011	-1.478861 -.1957047
lnpx4	-.9111679	.5511692	-1.65	0.098	-1.99144 .1691039
_cons	24.81121	9.918929	2.50	0.012	5.370467 44.25195
2lnqt					
lnpd	-2.574157	.4046743	-6.36	0.000	-3.367304 -1.78101
lngdp	.5212921	.0955104	5.46	0.000	.3340951 .708489
_cons	35.93499	5.106302	7.04	0.000	25.92682 45.94316

Endogenous variables: lnqt lnpd
 Exogenous variables: lnpx2 lnpx3 lnpx4 lngdp

32 . reg3 (lnqt lnpd lnpx2 lnpx3 lnpx4) (lnqt lnpd lngdp), 3sls ireg3 inst(lnpx2 lnpx3 lnpx4 lngdp)

Iteration 1: tolerance = .02535182
 Iteration 2: tolerance = .01003058
 Iteration 3: tolerance = .00390723
 Iteration 4: tolerance = .00151264
 Iteration 5: tolerance = .00058419
 Iteration 6: tolerance = .00022541
 Iteration 7: tolerance = .00008694
 Iteration 8: tolerance = .00003353
 Iteration 9: tolerance = .00001293
 Iteration 10: tolerance = 4.986e-06
 Iteration 11: tolerance = 1.923e-06
 Iteration 12: tolerance = 7.415e-07

Three-stage least-squares regression, iterated

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
lnqt	22	4	.2063295	0.7629	80.89	0.0000
2lnqt	22	2	.135203	0.8982	178.41	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
lnqt					
lnpd	.795862	1.370509	0.58	0.561	-1.890287 3.482011
lnpx2	-.6132584	.214736	-2.86	0.004	-1.034133 -.1923836
lnpx3	-.8624556	.3291486	-2.62	0.009	-1.507575 -.2173363
lnpx4	-.8799661	.5549316	-1.59	0.113	-1.967612 .2076798
_cons	24.72031	9.994251	2.47	0.013	5.131936 44.30868
2lnqt					
lnpd	-2.574157	.4046743	-6.36	0.000	-3.367304 -1.78101
lngdp	.5212921	.0955104	5.46	0.000	.3340951 .708489
_cons	35.93499	5.106302	7.04	0.000	25.92682 45.94316

Endogenous variables: lnqt lnpd
Exogenous variables: lnpx2 lnpx3 lnpx4 lngdp

33 . save "C:\Users\Pongpanot\Downloads\assign2.dta", replace
file C:\Users\Pongpanot\Downloads\assign2.dta saved

34 . log close
name: <unnamed>
log: C:\Users\Pongpanot\Downloads\assignment 2 mat.smcl
log type: smcl
closed on: 4 Feb 2021, 03:02:57
