

Seemingly Unrelated Regression (SUR) Models

```

set obs 400
mat C=(1,0.9\0.9,1)
corr2data u1 u2, n(400) means(0 0) sds(8 9) corr(C)
g x1=rnormal(1,10)
g x2=rnormal(2,20)
g x3=rnormal(-1,10)
g x4=rnormal(3,10)
g y1=1+0.1*x1+0.2*x2+u1
g y2=2+0.1*x3+0.2*x4+u2

```

```
. reg y1 x1 x2
```

Source	SS	df	MS	Number of obs	=	400
Model	6396.30768	2	3198.15384	F(2, 397)	=	49.77
Residual	25510.4448	397	64.2580474	Prob > F	=	0.0000
				R-squared	=	0.2005
				Adj R-squared	=	0.1964
Total	31906.7525	399	79.9667982	Root MSE	=	8.0161

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x1	.1223002	.0428067	2.86	0.005	.0381441	.2064563
x2	.1940088	.0198093	9.79	0.000	.1550646	.232953
_cons	.9955992	.4032669	2.47	0.014	.2027936	1.788405

```
. reg y2 x3 x4
```

Source	SS	df	MS	Number of obs	=	400
Model	1880.45146	2	940.22573	F(2, 397)	=	11.62
Residual	32120.5595	397	80.9082104	Prob > F	=	0.0000
				R-squared	=	0.0553
				Adj R-squared	=	0.0505
Total	34001.011	399	85.2155664	Root MSE	=	8.9949

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x3	.0331711	.0439497	0.75	0.451	-.0532321	.1195743
x4	.2248807	.0481634	4.67	0.000	.1301936	.3195679
_cons	1.907247	.4633147	4.12	0.000	.9963895	2.818104

```
. sureg (y1 x1 x2) (y2 x3 x4)
```

Seemingly unrelated regression

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
y1	400	2	7.98606	0.2005	514.34	0.0000
y2	400	2	8.975366	0.0523	122.98	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
y1						
x1	.1239373	.0187545	6.61	0.000	.0871791	.1606955
x2	.1926824	.0086663	22.23	0.000	.1756968	.2096681
_cons	.9967315	.3997738	2.49	0.013	.2131893	1.780274
y2						
x3	.0811216	.0192349	4.22	0.000	.0434218	.1188213
x4	.2068554	.0210995	9.80	0.000	.1655012	.2482097
_cons	1.97418	.4507025	4.38	0.000	1.090819	2.85754

Example:

Study on trading value of three different groups of investors including individual, institution, and foreign investors. The models are as follows:

$$QLN_t = \beta_{10} + \beta_{11}SET_t + \beta_{12}PE_t + \beta_{13}DY_t + \beta_{14}DUM_t + \varepsilon_{1t}$$

$$QLI_t = \beta_{20} + \beta_{21}SET_t + \beta_{22}PE_t + \beta_{23}DY_t + \beta_{24}DUM_t + \beta_{25}DJ_t + \beta_{26}IB_t + \varepsilon_{2t}$$

$$QF_t = \beta_{30} + \beta_{31}SET_t + \beta_{32}PE_t + \beta_{33}DY_t + \beta_{34}DUM_t + \beta_{35}FX_t + \beta_{36}IB_t + \varepsilon_{3t}$$

The disturbance terms ε_{1t} , ε_{2t} , and ε_{3t} are assumed to be correlated.

OLS:

```
. reg3 (qln set pe dy dum) (qli set dj ib pe dy dum) (qf set fx ib pe dy dum), o
Multivariate regression
```

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
qln	84	4	5047.675	0.4640	17.10	0.0000
qli	84	6	1826.843	0.2180	3.58	0.0021
qf	84	6	5802.913	0.4669	11.24	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
qln					
set	-345.1613	48.03645	-7.19	0.000	-439.8026 -250.52
pe	-534.6304	168.594	-3.17	0.002	-866.7938 -202.467
dy	-2115.715	539.4979	-3.92	0.000	-3178.632 -1052.797
dum	-3718.633	1984.562	-1.87	0.062	-7628.613 191.3469
_cons	12337.82	3805.531	3.24	0.001	4840.173 19835.47
qli					
set	-48.97907	18.3963	-2.66	0.008	-85.22341 -12.73473
dj	135.2776	59.33954	2.28	0.024	18.36695 252.1882
ib	88.29653	67.38561	1.31	0.191	-44.46645 221.0595
pe	-182.7578	83.29688	-2.19	0.029	-346.8691 -18.64644
dy	-917.2405	392.641	-2.34	0.020	-1690.821 -143.6602
dum	-628.3281	860.6836	-0.73	0.466	-2324.045 1067.389
_cons	3089.883	1839.067	1.68	0.094	-533.4418 6713.207
qf					
set	376.5217	55.84303	6.74	0.000	266.4999 486.5436
fx	102.815	218.4466	0.47	0.638	-327.5679 533.1979
ib	-98.88969	210.3643	-0.47	0.639	-513.3488 315.5695
pe	751.3749	273.1862	2.75	0.006	213.1441 1289.606
dy	3042.807	1235.314	2.46	0.014	608.9934 5476.62
dum	3324.652	3827.915	0.87	0.386	-4217.098 10866.4
_cons	-18891.85	8782.692	-2.15	0.033	-36195.49 -1588.212

SUR:

```
. reg3 (qln set pe dy dum) (qli set dj ib pe dy dum) (qf set fx ib pe dy dum), sur
Seemingly unrelated regression
```

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
qln	84	4	4895.142	0.4640	72.72	0.0000
qli	84	6	1797.71	0.1739	18.59	0.0049
qf	84	6	5563.745	0.4653	76.49	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
qln					

	set	-345.1613	46.58486	-7.41	0.000	-436.4659	-253.8566
	pe	-534.6304	163.4993	-3.27	0.001	-855.0831	-214.1776
	dy	-2115.715	523.1951	-4.04	0.000	-3141.158	-1090.271
	dum	-3718.633	1924.592	-1.93	0.053	-7490.764	53.49775
	_cons	12337.82	3690.534	3.34	0.001	5104.508	19571.13

qli	set	-36.4466	16.72057	-2.18	0.029	-69.21832	-3.674872
	dj	11.63355	15.65562	0.74	0.457	-19.05089	42.318
	ib	115.9576	61.82175	1.88	0.061	-5.210785	237.126
	pe	-199.5312	78.51039	-2.54	0.011	-353.4088	-45.6537
	dy	-1040.228	365.219	-2.85	0.004	-1756.044	-324.4121
	dum	-1001.492	802.6055	-1.25	0.212	-2574.57	571.5858
	_cons	3753.84	1719.156	2.18	0.029	384.3559	7123.324

qf	set	380.311	52.87754	7.19	0.000	276.673	483.9491
	fx	3.099417	18.89913	0.16	0.870	-33.9422	40.14104
	ib	-118.3508	64.30475	-1.84	0.066	-244.3858	7.684168
	pe	736.5373	193.5326	3.81	0.000	357.2204	1115.854
	dy	3165.703	677.6422	4.67	0.000	1837.549	4493.857
	dum	4714.671	2238.532	2.11	0.035	327.2284	9102.113
	_cons	-16243.51	4380.287	-3.71	0.000	-24828.71	-7658.301

Alternative Command for SUR:

. sureg (qln set pe dy dum) (qli set dj ib pe dy dum) (qf set fx ib pe dy dum)

Seemingly unrelated regression

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
qln	84	4	4895.142	0.4640	72.72	0.0000
qli	84	6	1797.71	0.1739	18.59	0.0049
qf	84	6	5563.745	0.4653	76.49	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
qln					
set	-345.1613	46.58486	-7.41	0.000	-436.4659 -253.8566
pe	-534.6304	163.4993	-3.27	0.001	-855.0831 -214.1776
dy	-2115.715	523.1951	-4.04	0.000	-3141.158 -1090.271
dum	-3718.633	1924.592	-1.93	0.053	-7490.764 53.49775
_cons	12337.82	3690.534	3.34	0.001	5104.508 19571.13
qli					
set	-36.4466	16.72057	-2.18	0.029	-69.21832 -3.674872
dj	11.63355	15.65562	0.74	0.457	-19.05089 42.318
ib	115.9576	61.82175	1.88	0.061	-5.210785 237.126
pe	-199.5312	78.51039	-2.54	0.011	-353.4088 -45.6537
dy	-1040.228	365.219	-2.85	0.004	-1756.044 -324.4121
dum	-1001.492	802.6055	-1.25	0.212	-2574.57 571.5858
_cons	3753.84	1719.156	2.18	0.029	384.3559 7123.324
qf					
set	380.311	52.87754	7.19	0.000	276.673 483.9491
fx	3.099417	18.89913	0.16	0.870	-33.9422 40.14104
ib	-118.3508	64.30475	-1.84	0.066	-244.3858 7.684168
pe	736.5373	193.5326	3.81	0.000	357.2204 1115.854
dy	3165.703	677.6422	4.67	0.000	1837.549 4493.857
dum	4714.671	2238.532	2.11	0.035	327.2284 9102.113
_cons	-16243.51	4380.287	-3.71	0.000	-24828.71 -7658.301

Simultaneous-Equation Models

Example: Klein's Model I

System equations model that frequently used is simultaneous equations model. A well know macroeconometrics model is Klein's (1950) Model I, which has the following equations form:

$$C_t = \alpha_0 + \alpha_1 P_t + \alpha_2 P_{t-1} + \alpha_3 (W_t^P + W_t^G) + \varepsilon_{1t} \quad (\text{Consumption}),$$

$$I_t = \beta_0 + \beta_1 P_t + \beta_2 P_{t-1} + \beta_3 K_{t-1} + \varepsilon_{2t} \quad (\text{Investment}),$$

$$W_t^P = \gamma_0 + \gamma_1 X_t + \gamma_2 X_{t-1} + \gamma_3 A_t + \varepsilon_{3t} \quad (\text{Private wages}),$$

$$X_t = C_t + I_t + G_t \quad (\text{equilibrium demand}),$$

$$P_t = X_t - T_t - W_t^P \quad (\text{private profits}),$$

$$K_t = K_{t-1} + I_t \quad (\text{capital stock}),$$

where

- C_t = Consumption at time t
- I_t = Investment at time t
- W_t^P = Private wages at time t
- X_t = Total demand at time t
- P_t = Private profits at time t
- K_t = Capital stock at time t
- G_t = Government nonwage spending at time t
- T_t = Indirect business taxes plus net exports at time t
- W_t^G = Government wage bill at time t
- A_t = Time trend measured as years from 1931

Endogenous variables are all variables on the left hand side including consumption (C_t), investment (I_t), and private wages (W_t^P). Exogenous variables include government nonwage spending (G_t), indirect business taxes plus net exports (T_t), government wage will (W_t^G), and time trend (A_t). However, there are also predetermined variables including total demand (X_t), private profit (P_t), and capital stock from last year (K_{t-1}). This system model consists of 3 behavior equation and 1 equilibrium condition, and 2 identities. This simultaneous model is a dynamic model for a small economy. Klein (1950) estimated this model using data from 1921 to 1941.

The model is estimated using the data from 1921 to 1941. Methods of estimation include Ordinary Least Squares (OLS), Two Stages Least Squares: 2SLS, (Three stage Least squares: 3SLS, and Iterative Three Stages Least Squares: I3SLS.

```
. tsset year
      time variable: year, 1920 to 1941
      delta: 1 unit
```

```
. g w = wg+wp
. g k = k1+i
. g yr=year-1931
. g p1 = l.p1
. g x1 = l.x
```

```
. reg c p p1 w
```

Source	SS	df	MS	Number of obs = 21		
Model	923.549937	3	307.849979	F(3, 17) =	292.71	
Residual	17.8794524	17	1.05173249	Prob > F =	0.0000	
Total	941.429389	20	47.0714695	R-squared =	0.9810	
				Adj R-squared =	0.9777	
				Root MSE =	1.0255	

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
c						
p	.1929343	.0912102	2.12	0.049	.0004977	.385371
p1	.0898847	.0906479	0.99	0.335	-.1013658	.2811351
w	.7962188	.0399439	19.93	0.000	.7119444	.8804931
_cons	16.2366	1.302698	12.46	0.000	13.48815	18.98506

```
. reg3 (c p p1 w), 2sls inst(t wg g yr p1 x1 k1)
```

Two-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
c	21	3	1.135659	0.9767	279.0941	0.0000

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
c						
p	.0173022	.1180494	0.15	0.885	-.2317603	.2663647
p1	.2162338	.107268	2.02	0.060	-.0100818	.4425495
w	.8101827	.0402497	20.13	0.000	.7252632	.8951022
_cons	16.55476	1.320793	12.53	0.000	13.76813	19.34139

Endogenous variables: c p w
 Exogenous variables: t wg g yr p1 x1 k1

```
. reg p t wg g yr p1 x1 k1
```

Source	SS	df	MS	Number of obs = 21		
Model	294.248018	7	42.0354311	F(7, 13) =	8.82	
Residual	61.9500944	13	4.76539188	Prob > F =	0.0004	
Total	356.198112	20	17.8099056	R-squared =	0.8261	
				Adj R-squared =	0.7324	
				Root MSE =	2.183	

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
p						
t	-.9230977	.4337595	-2.13	0.053	-1.860178	.0139827
wg	-.0796076	2.533823	-0.03	0.975	-5.5536	5.394385
g	.4390162	.3911427	1.12	0.282	-.4059962	1.284029
yr	.3194049	.7781286	0.41	0.688	-1.36164	2.000449
p1	.8025008	.5188558	1.55	0.146	-.318419	1.923421
x1	.0220002	.2821641	0.08	0.939	-.5875783	.6315787
k1	-.2161035	.1191134	-1.81	0.093	-.4734323	.0412253
_cons	50.38438	31.63026	1.59	0.135	-17.94863	118.7174

```
. predict phat
(option xb assumed; fitted values)
(1 missing value generated)
```

```
. reg w t wg g yr p1 x1 k1
```

Source	SS	df	MS	Number of obs =	21
--------	----	----	----	-----------------	----

Model	1101.80519	7	157.400741	F(7, 13) =	51.15
Residual	40.0071584	13	3.07747372	Prob > F	= 0.0000
				R-squared	= 0.9650
				Adj R-squared	= 0.9461
Total	1141.81235	20	57.0906174	Root MSE	= 1.7543

w	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
t	-.6041532	.3485755	-1.73	0.107	-1.357205 .1488984
wg	.5562761	2.036218	0.27	0.789	-3.842705 4.955257
g	.8662196	.314328	2.76	0.016	.1871552 1.545284
yr	.7135829	.6253155	1.14	0.274	-.6373292 2.064495
p1	.8719211	.4169601	2.09	0.057	-.0288665 1.772709
x1	.0953288	.2267512	0.42	0.681	-.3945374 .5851951
k1	-.1229518	.0957213	-1.28	0.221	-.329745 .0838415
_cons	43.43552	25.41854	1.71	0.111	-11.47789 98.34894

. predict what
(option xb assumed; fitted values)
(1 missing value generated)

. reg c phat p1 what

Source	SS	df	MS	Number of obs =	21
Model	874.172577	3	291.390859	F(3, 17) =	73.65
Residual	67.2568126	17	3.95628309	Prob > F	= 0.0000
				R-squared	= 0.9286
				Adj R-squared	= 0.9160
Total	941.429389	20	47.0714695	Root MSE	= 1.989

c	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
phat	.0173023	.2297973	0.08	0.941	-.4675275 .5021322
p1	.2162337	.2088099	1.04	0.315	-.2243166 .6567841
what	.8101827	.0783509	10.34	0.000	.6448768 .9754886
_cons	16.55476	2.57108	6.44	0.000	11.13025 21.97926

All equations can be estimated in one single command in reg3 as follows:

OLS:

```
reg3 (c p p1 w) (i p p1 k1) (wp x x1 yr), o1s
```

Multivariate regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
c	21	3	1.02554	0.9810	292.7075	0.0000
i	21	3	1.009447	0.9313	76.87538	0.0000
wp	21	3	.7671466	0.9874	444.5687	0.0000

		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
c	p	.1929343	.0912102	2.12	0.039	.0098223 .3760464
	p1	.0898847	.0906479	0.99	0.326	-.0920987 .271868
	w	.7962188	.0399439	19.93	0.000	.716028 .8764095
	_cons	16.2366	1.302698	12.46	0.000	13.62133 18.85188
i	p	.4796356	.0971146	4.94	0.000	.28467 .6746012
	p1	.3330387	.1008592	3.30	0.002	.1305554 .535522
	k1	-.1117947	.0267276	-4.18	0.000	-.1654525 -.0581369
	_cons	10.12579	5.465546	1.85	0.070	-.8467492 21.09833
wp	x	.4394769	.0324076	13.56	0.000	.374416 .5045378
	x1	.14609	.0374231	3.90	0.000	.07096 .22122
	yr	.1302452	.0319103	4.08	0.000	.0661826 .1943077
	_cons	1.497043	1.270031	1.18	0.244	-1.052651 4.046737

2SLS:

```
reg3 (c p p1 w) (i p p1 k1) (wp x x1 yr), 2s1s nodfk inst(t wg g yr p1 x1 k1)
```

Two-stage least-squares regression

Equation	Obs	Parms	RMSE	"R-sq"	F-Stat	P
c	21	3	1.135659	0.9767	279.0941	0.0000
i	21	3	1.307149	0.8849	50.89437	0.0000
wp	21	3	.7671548	0.9874	524.005	0.0000

		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
c	p	.0173022	.1180494	0.15	0.884	-.2196919 .2542963
	p1	.2162338	.107268	2.02	0.049	.0008844 .4315833
	w	.8101827	.0402497	20.13	0.000	.729378 .8909874
	_cons	16.55476	1.320793	12.53	0.000	13.90316 19.20636
i	p	.1502219	.1732292	0.87	0.390	-.1975503 .4979941
	p1	.6159434	.1627853	3.78	0.000	.2891382 .9427486
	k1	-.1577876	.0361262	-4.37	0.000	-.2303141 -.0852612
	_cons	20.27821	7.542704	2.69	0.010	5.135599 35.42082
wp	x	.4388591	.0356319	12.32	0.000	.3673251 .5103931
	x1	.1466739	.0388361	3.78	0.000	.0687071 .2246406
	yr	.1303956	.029141	4.47	0.000	.0718927 .1888985
	_cons	1.500296	1.147779	1.31	0.197	-.8039674 3.804559

Endogenous variables: c p w i wp x
 Exogenous variables: t wg g yr p1 x1 k1

3SLS:

```
reg3 (c p p1 w) (i p p1 k1) (wp x x1 yr), 3sls inst(t wg g yr p1 x1 k1)
```

Three-stage least squares regression

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
c	21	3	.9443305	0.9801	864.5909	0.0000
i	21	3	1.446736	0.8258	162.9808	0.0000
wp	21	3	.7211282	0.9863	1594.751	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
c					
p	.1248904	.1081291	1.16	0.248	-.0870387 .3368194
p1	.1631439	.1004382	1.62	0.104	-.0337113 .3599992
w	.790081	.0379379	20.83	0.000	.715724 .8644379
_cons	16.44079	1.304549	12.60	0.000	13.88392 18.99766
i					
p	-.0130791	.1618962	-0.08	0.936	-.3303898 .3042316
p1	.7557238	.1529331	4.94	0.000	.4559805 1.055467
k1	-.1948482	.0325307	-5.99	0.000	-.2586072 -.1310893
_cons	28.17785	6.793768	4.15	0.000	14.86231 41.49339
wp					
x	.4004919	.0318134	12.59	0.000	.3381388 .462845
x1	.181291	.0341588	5.31	0.000	.1143411 .2482409
yr	.149674	.0279352	5.36	0.000	.094922 .2044261
_cons	1.797216	1.115854	1.61	0.107	-.3898181 3.984251

Endogenous variables: c p w i wp x
Exogenous variables: t wg g yr p1 x1 k1

13SLS:

```
reg3 (c p p1 w) (i p p1 k1) (wp x x1 yr), 3sls ireg3 inst(t wg g yr p1 x1 k1)
```

Iteration 1: tolerance = .37125491

..

Iteration 24: tolerance = 7.049e-07

Three-stage least squares regression, iterated

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
c	21	3	.9565088	0.9796	970.3072	0.0000
i	21	3	2.134327	0.6209	56.77951	0.0000
wp	21	3	.7782334	0.9840	1312.188	0.0000

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
c					
p	.1645096	.0961979	1.71	0.087	-.0240348 .3530539
p1	.1765639	.0901001	1.96	0.050	-.0000291 .3531569
w	.7658011	.0347599	22.03	0.000	.6976729 .8339294
_cons	16.55899	1.224401	13.52	0.000	14.15921 18.95877
i					
p	-.3565316	.2601568	-1.37	0.171	-.8664296 .1533664
p1	1.011299	.2487745	4.07	0.000	.5237098 1.498888
k1	-.2602	.0508694	-5.12	0.000	-.3599022 -.1604978
_cons	42.89629	10.59386	4.05	0.000	22.13271 63.65987
wp					
x	.3747792	.0311027	12.05	0.000	.3138191 .4357394
x1	.1936506	.0324018	5.98	0.000	.1301443 .257157
yr	.1679262	.0289291	5.80	0.000	.1112263 .2246261
_cons	2.624766	1.195559	2.20	0.028	.2815124 4.968019

Endogenous variables: c p w i wp x
Exogenous variables: t wg g yr p1 x1 k1

Hausman Test:

```
. reg c p w p1
```

Source	SS	df	MS	Number of obs =	21
Model	923.549937	3	307.849979	F(3, 17) =	292.71
Residual	17.8794524	17	1.05173249	Prob > F =	0.0000
				R-squared =	0.9810
				Adj R-squared =	0.9777
Total	941.429389	20	47.0714695	Root MSE =	1.0255

c	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
p	.1929343	.0912102	2.12	0.049	.0004977 .385371
w	.7962188	.0399439	19.93	0.000	.7119444 .8804931
p1	.0898847	.0906479	0.99	0.335	-.1013658 .2811351
_cons	16.2366	1.302698	12.46	0.000	13.48815 18.98506

```
. estimates store ols
```

```
. ivregress 2sls c p1 (p w=t wg g yr p1 x1 k1)
```

```
Instrumental variables (2SLS) regression
```

```
Number of obs = 21
Wald chi2(3) = 837.28
Prob > chi2 = 0.0000
R-squared = 0.9767
Root MSE = 1.0218
```

c	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
p	.0173022	.1180494	0.15	0.883	-.2140704 .2486748
w	.8101827	.0402497	20.13	0.000	.7312947 .8890707
p1	.2162338	.107268	2.02	0.044	.0059925 .4264752
_cons	16.55476	1.320793	12.53	0.000	13.96605 19.14346

```
Instrumented: p w
```

```
Instruments: p1 t wg g yr x1 k1
```

```
. estimates store twostage
```

```
. hausman twostage ols
```

	---- Coefficients ----		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)	Difference	S.E.
	twostage	ols		
p	.0173022	.1929343	-.1756322	.0749424
w	.8101827	.7962188	.0139639	.004952
p1	.2162338	.0898847	.1263492	.057353

b = consistent under H₀ and H_a; obtained from ivregress
 B = inconsistent under H_a, efficient under H₀; obtained from regress

```
Test: Ho: difference in coefficients not systematic
```

```
chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 8.81
Prob>chi2 = 0.0319
(V_b-V_B is not positive definite)
```