

```

name: <unnamed>
log: H:\Documents and Settings\Lee\My Documents\Document\stata\hetero.smcl
log type: smcl
opened on: 7 Apr 2010, 08:29:44
    
```

```

. do "H:\Documents and Settings\Lee\My Documents\Document\stata\heterosked.do"
. * This example is in Cameron and Trivedi, ch 5
. clear
. * Generated data for heteroskedasticity
. set seed 10101
. quietly set obs 500
. generate double x2 = 5 * rnormal(0)
. generate double x3 = 5 * rnormal(0)
. generate double e = 5 * rnormal(0)
. generate double u = sqrt(exp(-1.+0.2*x2))*e
. generate double y = 1 + 1*x2+1*x3+u
.
. summarize
    
```

Variable	Obs	Mean	Std. Dev.	Min	Max
x2	500	-.0357347	4.929534	-17.05808	15.1011
x3	500	.08222	5.001709	-14.89073	15.9748
e	500	-.04497	5.130303	-12.57444	18.65422
u	500	-.1564096	3.80155	-17.38211	16.09441
y	500	.8900757	7.709741	-21.65168	28.89449

```

. * OLS with default (inconsistent) std errors
. reg y x2 x3
    
```

Source	SS	df	MS	Number of obs =	500
Model	22566.6872	2	11283.3436	F(2, 497) =	790.51
Residual	7093.92492	497	14.2734908	Prob > F =	0.0000
Total	29660.6122	499	59.4401046	R-squared =	0.7608
				Adj R-squared =	0.7599
				Root MSE =	3.778

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
x2	.9271964	.0343585	26.99	0.000	.8596905 .9947023
x3	.9384295	.0338627	27.71	0.000	.8718977 1.004961
_cons	.8460511	.168987	5.01	0.000	.5140341 1.178068

```
. * OLS with robust std errors
. reg y x2 x3, vce(hc3)
```

Linear regression

Number of obs = 500
 F(2, 497) = 640.45
 Prob > F = 0.0000
 R-squared = 0.7608
 Root MSE = 3.778

y	Coef.	Robust HC3 Std. Err.	t	P> t	[95% Conf. Interval]	
x2	.9271964	.0458254	20.23	0.000	.8371611	1.017232
x3	.9384295	.040479	23.18	0.000	.8588983	1.017961
_cons	.8460511	.1713677	4.94	0.000	.5093566	1.182746

```
. * Diagnostic plots
. quietly reg y x2 x3

. predict double uhat, resid

. generate double absu = abs(uhat)

. quietly twoway (scatter absu x2) (lowess absu x2, bw(0.4) lw(thick), scale(1.2) xscale(tick)
> (*5)) yscale(tick) plotr(style(none)) name(gls1)

. quietly twoway (scatter absu x3) (lowess absu x3, bw(0.4) lw(thick), scale(1.2) xscale(tick)
> (*5)) yscale(tick) plotr(style(none)) name(gls2)

. graph combine gls1 gls2
```

```
. * Breusch-Pagan test
. reg y x2 x3
```

Source	SS	df	MS	Number of obs =	500
Model	22566.6872	2	11283.3436	F(2, 497) =	790.51
Residual	7093.92492	497	14.2734908	Prob > F =	0.0000
Total	29660.6122	499	59.4401046	R-squared =	0.7608
				Adj R-squared =	0.7599
				Root MSE =	3.778

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x2	.9271964	.0343585	26.99	0.000	.8596905	.9947023
x3	.9384295	.0338627	27.71	0.000	.8718977	1.004961
_cons	.8460511	.168987	5.01	0.000	.5140341	1.178068

```
. hettest x2, iid
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance
 Variables: x2

chi2(1) = 77.06
 Prob > chi2 = 0.0000

```
. * Manual Version
. quietly regress y x2 x3
. predict ehat, res
. gen ehat2=ehat*ehat
. quietly reg ehat2 x2
. scalar LM = e(N)*e(r2)
. scalar pvalue = chi2tail(1, LM)
. scalar list LM pvalue
      LM = 77.060987
      pvalue = 1.658e-18
```

```
. * Whites Test
. quietly reg y x2 x3
. estat imtest, white
```

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity

chi2(5) = **110.97**
Prob > chi2 = **0.0000**

Cameron & Trivedi's decomposition of IM-test

Source	chi 2	df	p
Heteroskedasticity	110.97	5	0.0000
Skewness	6.51	2	0.0386
Kurtosis	9.98	1	0.0016
Total	127.46	8	0.0000

```
. * FGLS estimation
. drop uhat
. quietly reg y x2 x3
. predict double uhat, resid
. generate double uhatsq = uhat*uhat
. generate double one = 1
. nl (uhatsq = exp({xb: x2 one})), nolog
(obs = 500)
```

Source	SS	df	MS
Model	188726.865	2	94363.4324
Residual	384195.497	498	771.476902
Total	572922.362	500	1145.84472

Number of obs = **500**
R-squared = **0.3294**
Adj R-squared = **0.3267**
Root MSE = **27.77547**
Res. dev. = **4741.088**

uhatsq	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
/xb_x2	.1427541	.0128147	11.14	0.000	.1175766	.1679317
/xb_one	2.462675	.1119496	22.00	0.000	2.242723	2.682626

. predict double varu, yhat

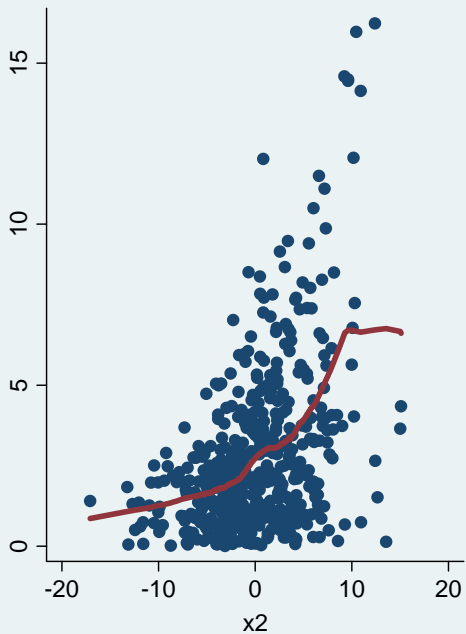
. regress y x2 x3 [aweight=1/varu]
(sum of wgt is 5.4993e+01)

Source	SS	df	MS	Number of obs = 500	
Model	29055.2584	2	14527.6292	F(2, 497) =	1890.74
Residual	3818.72635	497	7.68355401	Prob > F =	0.0000
Total	32873.9847	499	65.8797289	R-squared =	0.8838
				Adj R-squared =	0.8834
				Root MSE =	2.7719

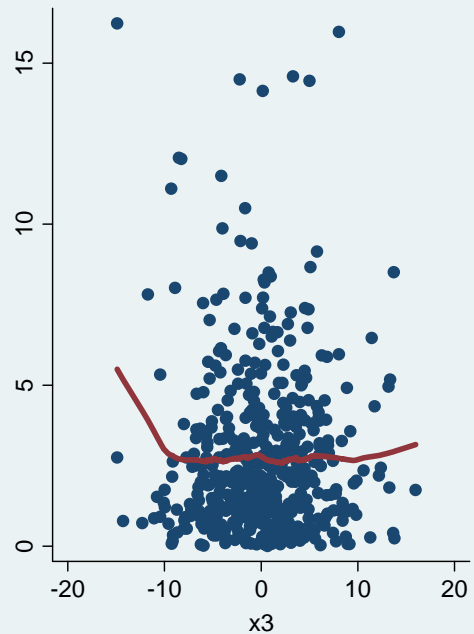
y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x2	.9880644	.0246626	40.06	0.000	.9396087	1.03652
x3	.9783926	.025276	38.71	0.000	.9287315	1.028054
_cons	.9522962	.1516564	6.28	0.000	.6543296	1.250263

. end of do-file

. log close
 name: <unnamed>
 log: H:\Documents and Settings\Lee\My Documents\Document\stata\hetero.smcl
 log type: smcl
 closed on: 7 Apr 2010, 08:30:03



● absu — lowess absu x2



● absu — lowess absu x3