

1)

. reg rfuture rspot if t>1

Source	SS	df	MS	Number of obs	=	7,683
Model	.01531231	1	.01531231	F(1, 7681)	=	6787.70
Residual	.017327485	7,681	2.2559e-06	Prob > F	=	0.0000
				R-squared	=	0.4691
				Adj R-squared	=	0.4691
Total	.032639795	7,682	4.2489e-06	Root MSE	=	.0015

rfuture	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
rspot	.7889924	.0095766	82.39	0.000	.7702196 .8077651
_cons	7.58e-06	.0000171	0.44	0.658	-.000026 .0000412

. estat archlm

LM test for autoregressive conditional heteroskedasticity (ARCH)

lags(p)	chi2	df	Prob > chi2
1	6.951	1	0.0084

H0: no ARCH effects vs. H1: ARCH(p) disturbance

2)

. arch rfuture rspot, arch(1) garch(1) nolog

ARCH family regression

Sample: 2 - 7684                      Number of obs = 7,683  
 Distribution: Gaussian                Wald chi2(1) = 144307.52  
 Log likelihood = 39695.02            Prob > chi2 = 0.0000

rfuture	Coef.	OPG Std. Err.	z	P> z	[95% Conf. Interval]
rfuture					
rspot	.8163565	.002149	379.88	0.000	.8121445 .8205684
_cons	9.03e-06	.0000117	0.77	0.442	-.000014 .000032
ARCH					
arch					
L1.	.1583881	.0035412	44.73	0.000	.1514473 .1653288
garch					
L1.	.7734091	.0038485	200.96	0.000	.7658662 .7809521
_cons	1.95e-07	5.80e-09	33.59	0.000	1.84e-07 2.06e-07

. est store garch11

```
. arch rfuture rspot, arch(1) garch(1/2) nolog
```

ARCH family regression

```
Sample: 2 - 7684                Number of obs =      7,683
Distribution: Gaussian           Wald chi2(1) =    118872.72
Log likelihood = 39697.75       Prob > chi2 =      0.0000
```

rfuture	OPG		z	P> z	[95% Conf. Interval]	
	Coef.	Std. Err.				
<b>rfuture</b>						
rspot	.8153024	.0023647	344.78	0.000	.8106677	.8199372
_cons	8.43e-06	.0000118	0.71	0.476	-.0000148	.0000316
<b>ARCH</b>						
arch						
L1.	.1729301	.0061173	28.27	0.000	.1609404	.1849198
garch						
L1.	.6135755	.0310702	19.75	0.000	.5526791	.674472
L2.	.1402245	.0250327	5.60	0.000	.0911613	.1892877
_cons	2.09e-07	8.64e-09	24.17	0.000	1.92e-07	2.26e-07

```
. est store garch21
```

```
. arch rfuture rspot, arch(1/2) garch(1) nolog
```

```
flat log likelihood encountered, cannot find uphill direction
r(430);
```

```
. arch rfuture rspot, arch(1/2) garch(1/2) nolog
```

```
flat log likelihood encountered, cannot find uphill direction
r(430);
```

```
. est table garch*, star(0.1 0.05 0.01) stat(N ll chi2 aic bic)
```

Variable	garch11	garch21
<b>rfuture</b>		
rspot	.81635648***	.81530244***
_cons	9.029e-06	8.434e-06
<b>ARCH</b>		
arch		
L1.	.15838806***	.17293011***
garch		
L1.	.77340915***	.61357553***
L2.		.14022448***
_cons	1.949e-07***	2.089e-07***
<b>Statistics</b>		
N	7683	7683
ll	39695.018	39697.749
chi2	144307.52	118872.72
aic	-79380.035	-79383.498
bic	-79345.302	-79341.818

Legend: \* p<.1; \*\* p<.05; \*\*\* p<.01

Choose the model with the lowest BIC which is GARCH(1,1)

3)

```
. predict rfutoref, y
(1 missing value generated)

. twoway (line rfutoref t) (scatter rfuture t)

. predict sigma2, variance

. line sigma2 t
```

