

Assignment 7

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According to LM test, $0.0084 < 0.05$ which this is significant, we reject null hypothesis that H_0 : has no ARCH effect. Thus a ARCH exist effect in this model.

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. g rspot=(spot/1.spot)-1
(1 missing value generated)
. g rfuture=(future/1.future)-1
(1 missing value generated)
. reg rfuture rspot

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

```

. est store ols
. estat archlm
LM test for autoregressive conditional heteroskedasticity (ARCH)

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

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(2) . qui arch rfuture rspot, arch(1) garch(1) nolog
. est store garch11
. qui arch rfuture rspot, arch(1) garch(1/2) nolog
. est store garch21
. qui arch rfuture rspot, arch(1/2) garch(1) nolog
flat log likelihood encountered, cannot find uphill direction
r(430);
. est store garch12
12 invalid name
r(7);
. qui arch rfuture rspot, arch(1/2) garch(1/2) nolog
flat log likelihood encountered, cannot find uphill direction
r(430);
. est store garch22
. est table garch*, star(0.1 0.05 0.01) stat(N ll chi2 aic bic)
    
```

ARCH			
arch			
L1.	.15839275***	.1729364***	
garch			
L1.	.77340651***	.61354908***	
L2.		.1402425***	
_cons	1.949e-07***	2.089e-07***	

_____000003			
L1.		.68844496***	
L2.		-.08678925	
_____000004			
L1.		-.68147208***	
L2.		.10808718	
_cons		8.922e-07***	

Statistics			
N	7683	7683	7650
ll	39695.018	39697.749	75810.682
chi2	144307.98	118871.71	
aic	-79380.035	-79383.498	-151611.36
bic	-79345.302	-79341.818	-151576.65

Variable	garch11	garch21	garch22
rfuture			
rspot	.8163588***	.81530327***	
_cons	9.035e-06	8.434e-06	

legend: * p<.1; ** p<.05; *** p<.01

The best BIC is the lowest one which is GARCH(1,1) # (p,q)

```

(3) ARCH family regression
Sample: 2 - 7684
Distribution: Gaussian
Log likelihood = 39695.02
Number of obs   =    7,683
Wald chi2(1)   =   144307.98
Prob > chi2    =    0.0000
    
```

rfuture	Coef.	OPG		z	P> z	[95% Conf. Interval]	
		Std. Err.					
rfuture							
rspot	.8163588	.002149	379.88	0.000	.8121468	.8205708	
_cons	9.03e-06	.0000117	0.77	0.441	-.000014	.000032	
ARCH							
arch							
L1.	.1583928	.0035413	44.73	0.000	.1514519	.1653336	
garch							
L1.	.7734065	.0038485	200.96	0.000	.7658637	.7809494	
_cons	1.95e-07	5.80e-09	33.59	0.000	1.84e-07	2.06e-07	

```

. predict rfutoref, y
(1 missing value generated)
. twoway (line rfutoref t) (scatter rfuture t)
. predict sigma2, variance
. line sigma2 t
    
```

