HW9

Omair Shafi Ahmed

14.3

a) An augmented dickey-fuller test is done for p = 0,1,2,3,4 and the corresponding BIC and AIC is calculated to decide the best p. With p = 1, the ADF statistic is -1.58, which, being smaller than -3.44 allows us to reject the null hypothesis. P = 2 also results in an ADF statistic less than -3.44.

```
. reg dy time L.y L.dy if tin(1955q1,2009q4),r

Linear regression                               Number of obs     =        220
                                                F(3, 216)         =       9.81
                                                Prob > F          =     0.0000
                                                R-squared         =     0.1389
                                                Root MSE          =     .00867
```

dy	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
time	.0001894	.0001266	1.50	0.136	-.0000601	.0004389
y L1.	-.0252585	.0159473	-1.58	0.115	-.0566907	.0061738
dy L1.	.3487863	.0747664	4.67	0.000	.2014211	.4961515
_cons	.2080206	.1275485	1.63	0.104	-.0433784	.4594197

```
. reg dy time L.y L(1/2).dy if tin(1955q1,2009q4),r

Linear regression                               Number of obs     =        220
                                                F(4, 215)         =       8.49
                                                Prob > F          =     0.0000
                                                R-squared         =     0.1531
                                                Root MSE          =     .00862
```

dy	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
time	.0002414	.0001326	1.82	0.070	-.0000201	.0005028
y L1.	-.0314597	.0166704	-1.89	0.060	-.064318	.0013986
dy L1.	.3109996	.0798289	3.90	0.000	.153652	.4683471
L2.	.1303913	.0833263	1.56	0.119	-.0338499	.2946324
_cons	.2566477	.133199	1.93	0.055	-.0058954	.5191908

```
. reg dy time L.y L(1/3).dy if tin(1955q1,2009q4),r

Linear regression                               Number of obs     =        220
                                                F(5, 214)         =       6.82
                                                Prob > F          =     0.0000
                                                R-squared         =     0.1544
                                                Root MSE          =     .00863
```

dy	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
time	.0002241	.0001342	1.67	0.096	-.0000404	.0004887
y						
L1.	-.0293833	.0168431	-1.74	0.083	-.0625831	.0038164
dy						
L1.	.3138763	.0799431	3.93	0.000	.1562996	.4714529
L2.	.1402701	.0891168	1.57	0.117	-.035389	.3159291
L3.	-.0402143	.0758439	-0.53	0.597	-.189711	.1092825
_cons	.240324	.1345183	1.79	0.075	-.0248265	.5054745

```
. reg dy time L.y L(1/4).dy if tin(1955q1,2009q4),r

Linear regression                               Number of obs     =        220
                                                F(6, 213)         =       5.85
                                                Prob > F          =     0.0000
                                                R-squared         =     0.1549
                                                Root MSE          =     .00865
```

dy	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
time	.0002151	.0001468	1.47	0.144	-.0000742	.0005044
y						
L1.	-.0282924	.0183671	-1.54	0.125	-.064497	.0079121
dy						
L1.	.3118539	.0803509	3.88	0.000	.1534691	.4702386
L2.	.1421678	.0904877	1.57	0.118	-.0361982	.3205338
L3.	-.0344698	.0753436	-0.46	0.648	-.1829845	.1140448
L4.	-.0226011	.0857673	-0.26	0.792	-.1916625	.1464604
_cons	.231766	.1464337	1.58	0.115	-.0568789	.5204108

```
. reg dy time L.y if tin(1955q1,2009q4),r

Linear regression                               Number of obs     =        220
                                                F(2, 217)         =       2.26
                                                Prob > F          =     0.1065
                                                R-squared         =     0.0239
                                                Root MSE          =     .00921
```

dy	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
time	.0000597	.0001434	0.42	0.678	-.0002229	.0003422
y L1.	-.0101309	.0180416	-0.56	0.575	-.04569	.0254282
_cons	.0906014	.1444148	0.63	0.531	-.1940339	.3752367

14.4

The F-Statistic being 3.7 is smaller than 5.86 implying that there is no break in the AR(l) model.

```
. qlrtest dy, ebegin(1955q1) eend(2009q4) chow(L.dy) fvar(fstat)
```

Variable	Obs	Mean	Std. Dev.	Min	Max
fstat	154	1.103678	.6731129	.0727904	3.719405

14.5

c) There is evidence of a break as the maximum f-statistic, being 5.09 is greater than 4.53, implies that the null hypothesis can be rejected.

```
. qlrtest dy L.dy, ebegin(1955q1) eend(2009q4) chow(L1.dr L2.dr L3.dr L4.dr) fvar(fstat1)
```

Variable	Obs	Mean	Std. Dev.	Min	Max
fstat1	154	3.734356	.6231697	1.65061	5.095863

14.6

A)

```
. pfregress dy L.dy, ebegin(1955q1) eend(1989q4) fend(2009q4) horizon(1) pname(pdinf) ename(einf)
RMSFE = .00596043
```

B)

```
. pfregress dy L.dy, ebegin(1955q1) eend(1989q4) fend(2009q4) horizon(1) pname(pdinf) ename(einf)
RMSFE = .00596043
```

C)

```
. pfregress dy L.dy, ebegin(1955q1) eend(1989q4) fend(2009q4) horizon(1) pname(pdinf) ename(einf)
RMSFE = .00596043
```

D) The forecasts don’t appear to be biased. The AR(l) model has the smallest RSMFE, with an RMSFE of 2.38.