a).

① For li_1: $LR = -2 \times \left(-149.521 - (-134.178)\right) = 30.7 > 3.8$;

② For li_2: $LR = -2 \times \left(-139.747 - (-134.178)\right) = 11.1 > 3.8$;

③ For li_1 and li_2 jointly: $LR = -2 \times \left(-152.763 — 134.178\right) = 37.2 > 6.0$.

All of the above are significant.

b).

① When the models to be compared share the same dependent variable and same number of explanatory variables, we can use McFadden R^2.

② The optimal model according to this criterion is:

$$\mathrm{GDPIMPR}_t = 0.746 - 0.429\mathrm{li}_{1t}(-2) - 0.131\mathrm{li}_{2t}(-1) + \varepsilon_t$$

Explanatory Variables	McFadden R^2
li1(-2), li2(-1)	0.1468
li1(-2), li2(-2)	0.1460
li1(-1), li2(-2)	0.1220
li1(-1), li2(-1)	0.1217

c).

Date	Pridicted Prob.	GDPIMPR		Hit
		Proidicted	Actual	
2011Q1	0.24	0	1	
2011Q2	0.22	0	0	○
2011Q3	0.08	0	0	○
2011Q4	0.08	0	0	○
2012Q1	0.16	0	1	
2012Q2	0.23	0	0	○
2012Q3	0.38	0	1	
2012Q4	0.56	1	1	○
2013Q1	0.60	1	1	○
2013Q2	0.52	1	1	○
2013Q3	0.56	1	1	○
2013Q4	0.71	1	0	
2014Q1	0.74	1	0	
2014Q2	0.65	1	1	○
2014Q3	0.76	1	1	○
2014Q4	0.85	1	1	○
2015Q1	0.85	1	1	○
2015Q2	0.83	1	1	○
2015Q3	0.71	1	1	○
2015Q4	0.35	0	0	○

Hit rate = 0.75

d).

As $\mathrm{GROWTHRATE} = \Delta\mathrm{LOGGDP}$,

then $\mathrm{GROWTHRATE}(-1) = \mathrm{D}(\mathrm{LOGGDP}(-1))$;

T denotes the trend.

Dependent Variable: GROWTHRATE
Method: Least Squares
Date: 05/13/17 Time: 15:43
Sample (adjusted): 1951Q1 2010Q4
Included observations: 240 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.089935	0.037476	2.399775	0.0172
GROWTHRATE(-1)	0.612861	0.050087	12.23584	0.0000
LOGGDP(-1)	-0.019278	0.008130	-2.371164	0.0185
T	6.23E-05	2.59E-05	2.406563	0.0169

As observed, t-statistic of LOGGDP(-1) = -2.371164 > -3.7;

Conclusion: LOGGDP is non-stationary.

e).

② Suggested model:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001737	0.000320	5.432574	0.0000
GROWTHRATE(-1)	0.461579	0.048302	9.556130	0.0000
LI1(-1)	-0.001023	0.000130	-7.880028	0.0000
LI2(-1)	-0.000149	6.42E-05	-2.326183	0.0209

R-squared	0.507975	Mean dependent var	0.003406
Adjusted R-squared	0.501720	S.D. dependent var	0.005817

①

Explanatory Variables	R^2
li1(-1), li2(-1)	0.5080
li1(-1), li2(-2)	0.5077
li1(-2), li2(-1)	0.4772
li1(-2), li2(-2)	0.4771

f).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000100	0.000384	-0.261442	0.7940
GROWTHRATE(-1)	0.029135	0.079152	0.368094	0.7131
RESID01(-1)	-0.049992	0.103221	-0.484322	0.6286
LI1(-1)	3.14E-05	0.000149	0.210114	0.8338
LI2(-1)	2.77E-06	6.50E-05	0.042611	0.9660

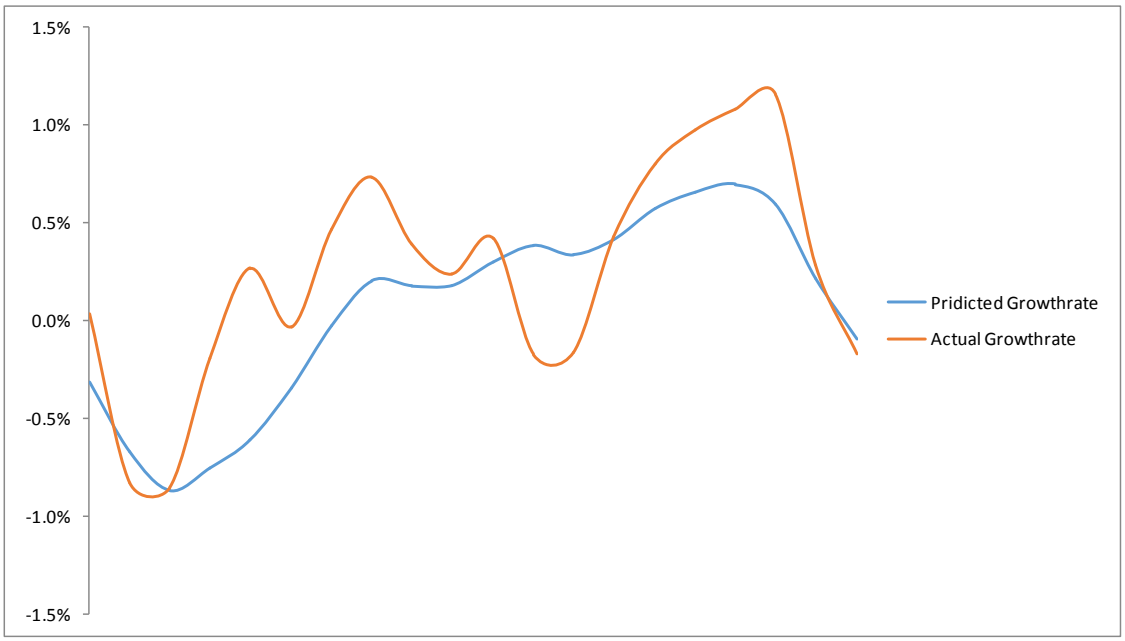
R-squared	0.001002	Mean dependent var	-6.65E-07
Adjusted R-squared	-0.016075	S.D. dependent var	0.004089

Breusch-Godfrey test: $nR^2 = 240 \times 0.001002 = 0.24 < 3.8$

Conclusion: there is no serial correlation

g).

RMSE=0.008156


1.5%
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Pridicted Growthrate
Actual Growthrate