Econometric 2

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Answer A I

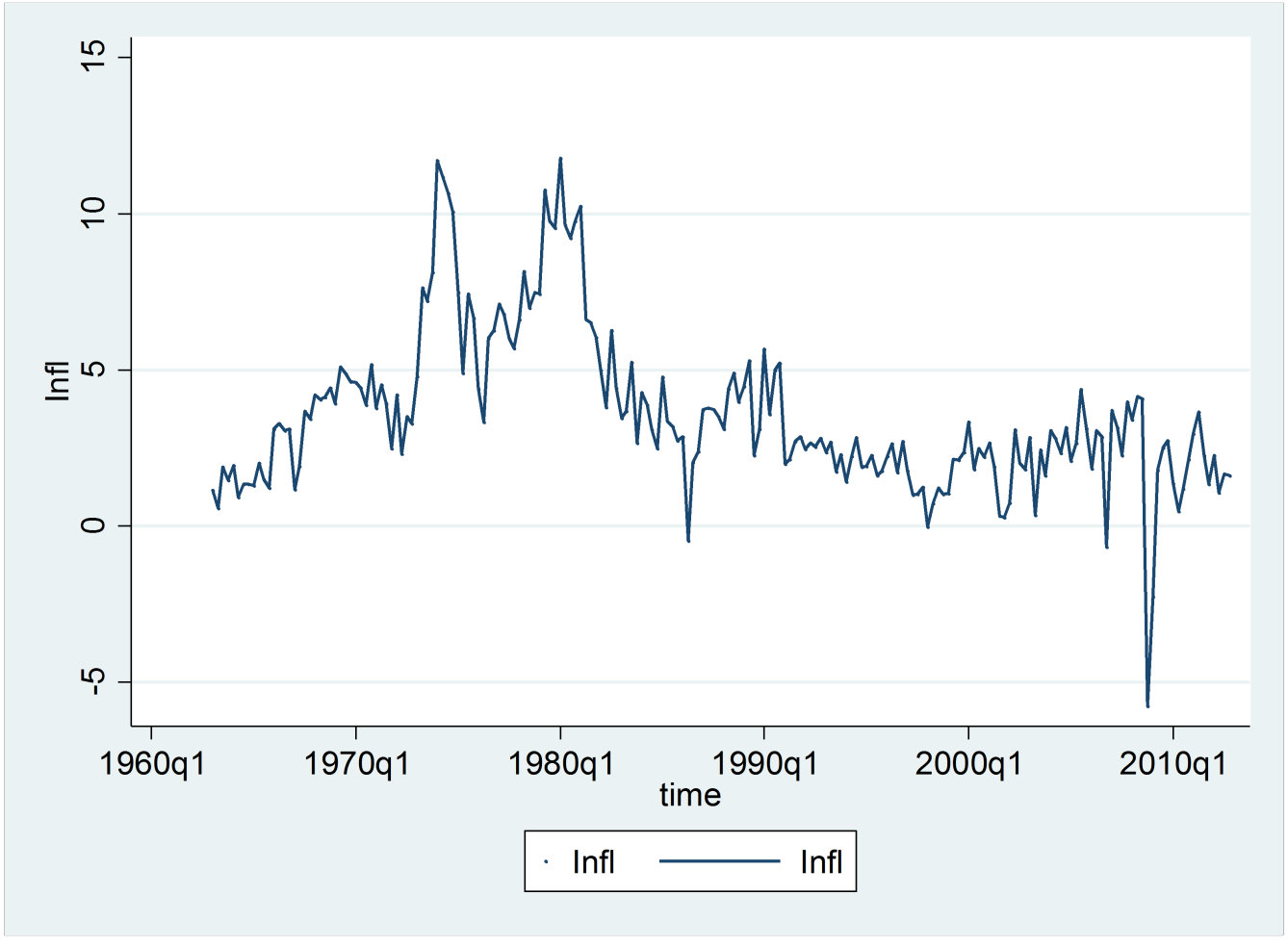
A.i.

In this question, *Infl* is the annualized percentage difference of inflation. The difference between current period logarithmic price index for personal consumption expenditures and last period logarithmic price index, the result times 400 is *Infl*. *Infl* is measured percentage per quarter, that is, logarithmic price index change one percentage in a quarter, *Infl* changes 400 percentage points.

A.ii.

Plot the value of *Infl* from 1963: Q1 through 2012: Q4 following. Based on the plot, *Infl* has a stochastic trend since trend is random and varies over time.

Answer A II


Infl
15
10
5
0
-5
1960q1
1970q1
1980q1
1990q1
2000q1
2010q1
time
Infl
Infl

Answer B I

B.i.

Compute the first four autocorrelations of *Infl*, we get following:

Linear regression

Number of obs	=	200
F(4, 195)	=	7.22
Prob > F	=	0.0000
R-squared	=	0.1402
Root MSE	=	1.4051

dInfl	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
dInfl						
L1.	-.3162191	.0640657	-4.94	0.000	-.4425698	-.1898684
L2.	-.2901691	.0842787	-3.44	0.001	-.4563839	-.1239543
L3.	-.0250792	.091814	-0.27	0.785	-.2061551	.1559967
L4.	-.1113044	.0845675	-1.32	0.190	-.2780888	.0554801
_cons	.0031298	.09937	0.03	0.975	-.1928481	.1991076

Answer B II

B.ii.

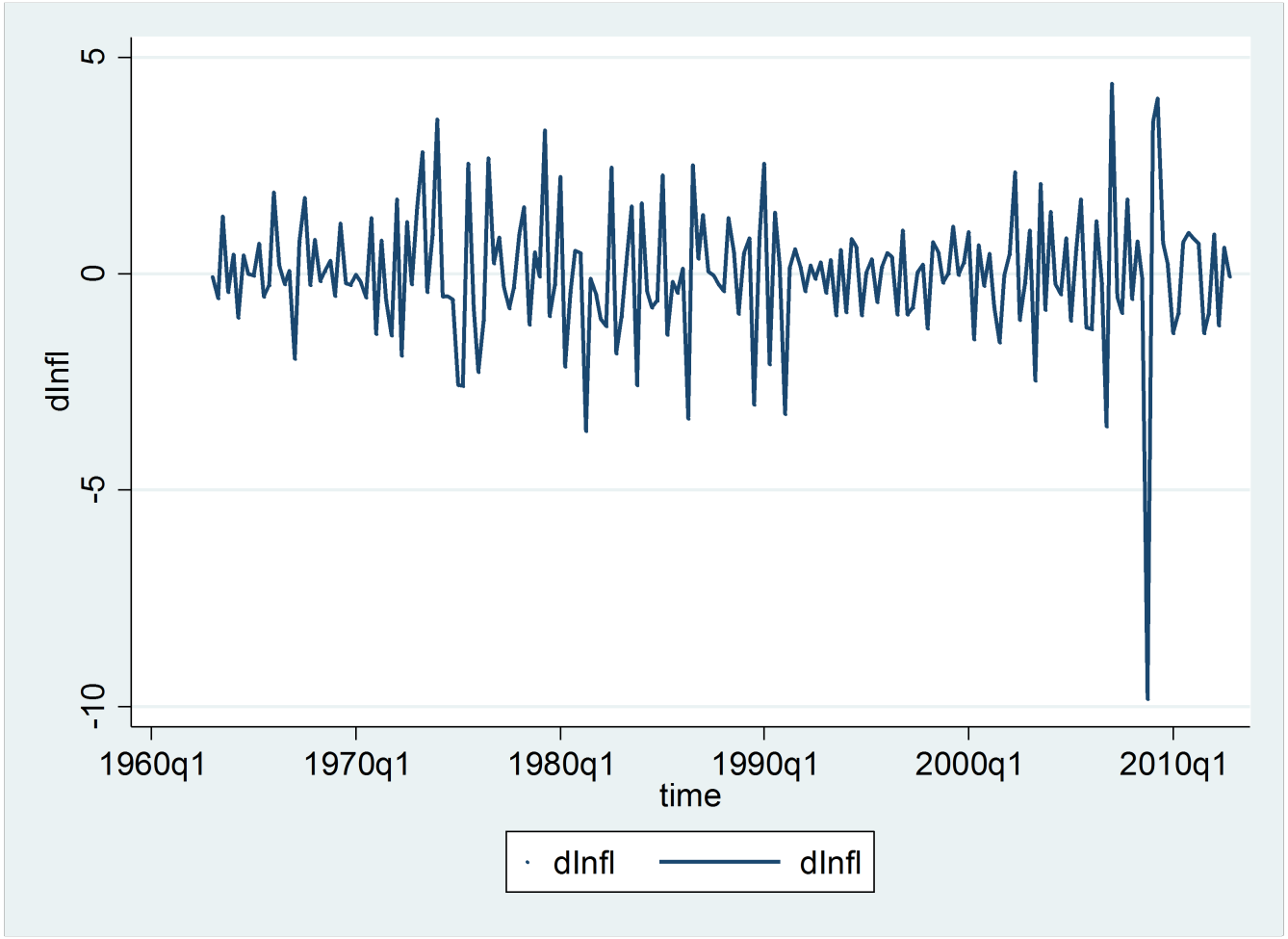
The plot looks choppy and jagged. In part (i), we calculated the first autocorrelation of *Infl*, the difference become more usual and changes each period, that is why the plot looks choppy and jagged.

Answer C I

C.i.

The regression of $Infl_t$ on $Infl_{t-1}$:

Answer C II


dlnfl
5
0
-5
-10
1960q1
1970q1
1980q1
1990q1
2000q1
2010q1
time
dlnfl
dlnfl

Answer C III

Since we already known

$$Infl_t = {}_0 + {}_1 Infl_{t1} + u_t, {}_0 = -0.0029, {}_1 = -0.2531,$$

that is

$$Infl_t = -0.0029 - 0.2531 Infl_{t1}.$$

According to constant and coefficient, we could predict the change in inflation next quarter, that is,

$$Infl_{t+1} = -0.0029 - 0.2531 Infl_t.$$

C.ii.

Estimate an AR(2) model for *Infl* :

Answer C IV

Linear regression

Number of obs	=	200	
F(1, 198)	=	12.67	
Prob > F	=	0.0005	
R-squared	=	0.0641	
Root MSE	=	1.4549	

dInfl	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
dInfl						
L1.	-.2531083	.0710989	-3.56	0.000	-.3933167	-.1129
_cons	.0028787	.1028673	0.03	0.978	-.1999774	.2057348

Compare with estimate results in part (i) and part (ii), all lag variables are statistic significant and Adjusted R squared is increased from 0.0593 to 0.1205, so the AR(2) model is better than an AR(1) model. Since the *Infl* may be influenced by last two

Answer C V

periods, adding one more lag variable might increase explanation of the model.

C.iii.

Estimate an AR(p) model for $p = 0, , 8$:

Linear regression

Number of obs	= 224
F(2, 221)	= 15.34
Prob > F	= 0.0000
R-squared	= 0.1356
Root MSE	= 1.4031

dInfl	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
dInfl						
L1.	-.3537413	.0651424	-5.43	0.000	-.4821212	-.2253615
L2.	-.2439319	.08183	-2.98	0.003	-.4051988	-.082665
_cons	-.011053	.0938173	-0.12	0.906	-.1959441	.1738381

In general, smaller is better. In this case, lag length is 2 when chosen by AIC, lag length is 2 when chosen by BIC.

Answer C VI

C.iv.

We know the AR(2) model is

$$Infl_t = -0.011 - 0.3537 Infl_{t1} - 0.2439 Infl_{t2}.$$

So

$$Infl_{2013:Q1} = -0.011 - 0.3537 Infl_{2012:Q4} - 0.2439 Infl_{2012:Q3} \Rightarrow$$
$$Infl_{2013:Q1} = -0.011 - 0.3537 - 0.0595 - 0.2439 - 0.6153 =$$

C.v.

The AR(2) model is

$$Infl_t = 0.4992 + 0.6766 Infl_{t1} + 0.1837 Infl_{t2}.$$

Answer C VII

So

$$Infl_{2013:Q1} = 0.4992 + 0.6766 Infl_{2012:Q4} + 0.1837 Infl_{2012:Q3} \Rightarrow$$

$$Infl_{2013:Q1} = 0.4992 + 0.67661.6127 + 0.18371.6722 \Rightarrow Infl_2$$

Answer D I

D.i.

$H_0 : \ = 0$ vs. $H_1 : \ < 0$ with two lags of $Infl$

Estimate $Infl = {}_0 + Infl_{t1} + {}_1 Infl_{t1} + {}_2 Infl_{t2} + u_t$

Answer D II

Linear regression

Number of obs	= 200
F(2, 197)	= 12.65
Prob > F	= 0.0000
R-squared	= 0.1293
Root MSE	= 1.4068

dInfl	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
dInfl						
L1.	-.3199819	.0668389	-4.79	0.000	-.4517934	-.1881704
L2.	-.264144	.0825595	-3.20	0.002	-.4269579	-.1013301
_cons	.0026299	.0994813	0.03	0.979	-.1935551	.1988148

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. estat ic, n(200)
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Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	200	-364.3863	-350.5364	3	707.0729	716.9679

Note: N=200 used in calculating BIC.