

Spring 2021 Time Series Final Exam – Output

Part 1: Data Exploration

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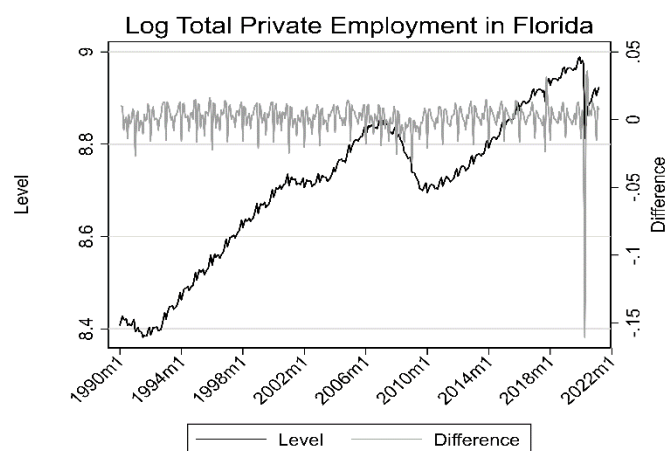
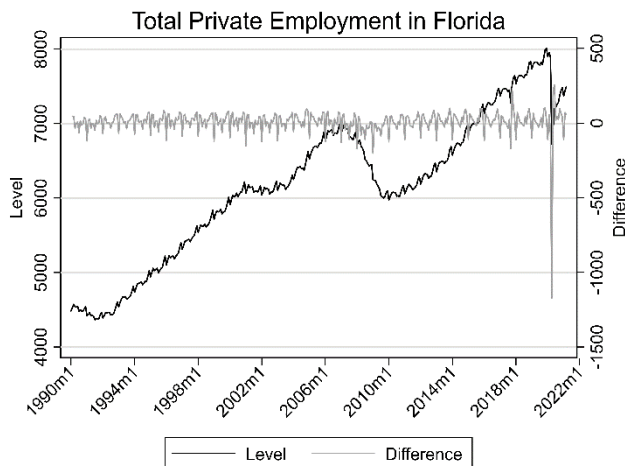
15 . format date %tm
16 . tsset date
    time variable:  date, 1990m1 to 2021m3
    delta: 1 month
17 . gen month=month(datec)
19 . summ construct leisure manufacture total

      Variable |      Obs      Mean   Std. Dev.      Min      Max
-----+-----
      construct |       375   461.0043    95.8947     323.9     696.1
      leisure   |       375   930.2083   159.6216     660.6    1287.5
  manufacture   |       375   410.0496    63.14375     307.9     518.2
      total     |       375  6161.164   958.2068    4366.1    8010.4

21 . gen lntotal=ln(total)
22 . gen lnconstruct=ln(construct)
23 . gen lnleisure=ln(leisure)
24 . gen lnmanufacture=ln(manufacture)
25 .
26 . twoway (tsline total, ytitle("Level", margin(small)) lc(black) ///
    >          tlabel(1990m1(48)2021m1 , angle(45) ) tttitle("") ///
    >          ylabel( , grid) ) ///
    >          (tsline d.total, yaxis(2) ytitle("Difference", ///
    >          margin(small) axis(2)) lc(gs10) ) ///
    >          if(total~=.), title("Total Private Employment in Florida") ///
    >          scheme(slmono) legend(order(1 "Level" 2 "Difference"))

29 . twoway (tsline lntotal, ytitle("Level", margin(large)) lc(black) ///
    >          tlabel(1990m1(48)2021m1 , angle(45) ) tttitle("") ///
    >          ylabel( , grid) ) ///
    >          (tsline d.lntotal, yaxis(2) ytitle("Difference", ///
    >          margin(small) axis(2)) lc(gs10) ) ///
    >          if(lntotal~=.), title("Log Total Private Employment in Florida") ///
    >          scheme(slmono) legend(order(1 "Level" 2 "Difference"))

```

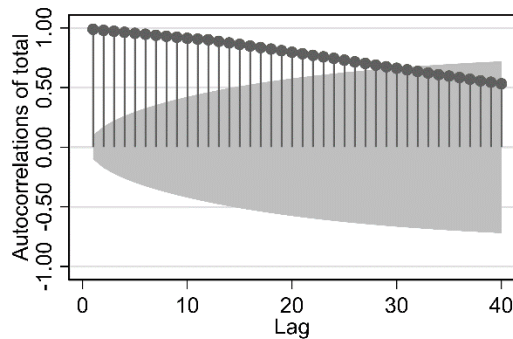


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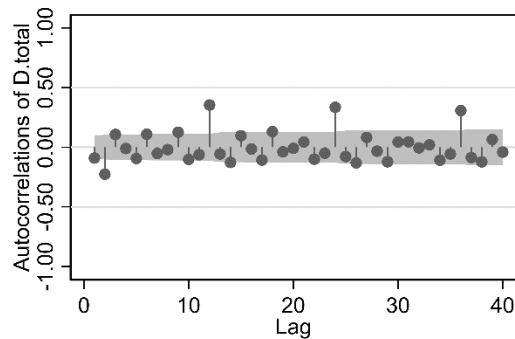
```

33 . ac total, scheme(slmono) ylab(-1(.5)1, grid) saving("ac total", replace)
38 (file ac total.gph saved)
34 . pac total, scheme(slmono) ylab(-1(.5)1, grid) saving("pac total", replace)
40 (file pac total.gph saved)
35 . ac d.total, scheme(slmono) ylab(-1(.5)1, grid) saving("ac d.total", replace)
42 (file ac d.total saved)
36 . pac d.total, scheme(slmono) ylab(-1(.5)1, grid) saving("pac d.total", replace)
44 (file pac d.total saved)
37 . graph combine "ac total" "ac d.total" ///
46 > "pac total" "pac d.total", scheme(slmono)

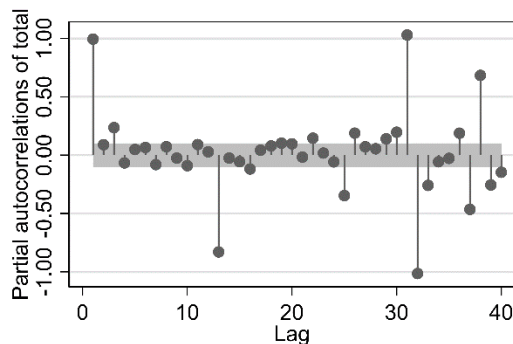
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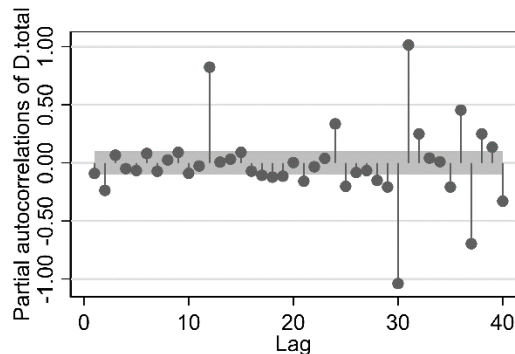
Bartlett's formula for MA(q) 95% confidence bands



Bartlett's formula for MA(q) 95% confidence bands



95% Confidence bands [se = 1/sqrt(n)]



95% Confidence bands [se = 1/sqrt(n)]

```

47
48 40 . dfuller total, trend regress lag(12)
49 Augmented Dickey-Fuller test for unit root          Number of obs   =          362
50 ----- Interpolated Dickey-Fuller -----
51 Test          1% Critical      5% Critical      10% Critical
52 Statistic      Value           Value           Value
53 -----
54 Z(t)           -2.755          -3.986          -3.426          -3.130
55 -----
56 MacKinnon approximate p-value for Z(t) = 0.2138
57 (Regression output omitted)
58
59

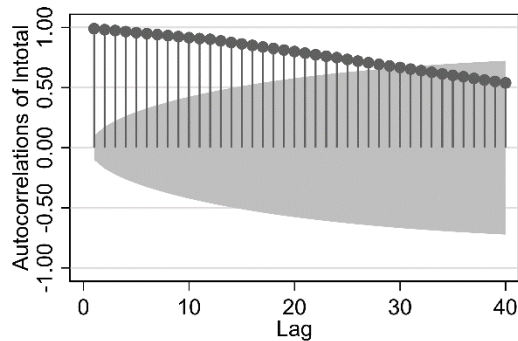
```

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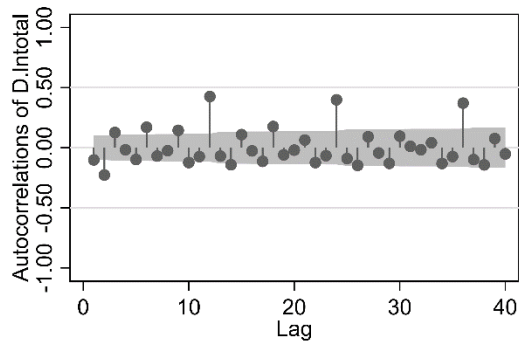
```

43 . ac lntotal, scheme(slmono) ylab(-1(.5)1, grid) saving("ac lntotal", replace)
61 (file ac lntotal.gph saved)
44 . pac lntotal, scheme(slmono) ylab(-1(.5)1, grid) saving("pac lntotal", replace)
63 (file pac lntotal.gph saved)
45 . ac d.lntotal, scheme(slmono) ylab(-1(.5)1, grid) saving("ac d.lntotal", repla
65 > ce)
66 (file ac d.lntotal saved)
46 . pac d.lntotal, scheme(slmono) ylab(-1(.5)1, grid) saving("pac d.lntotal", rep
68 > lace)
69 (file pac d.lntotal saved)
70 47 . graph combine "ac lntotal" "ac d.lntotal" ///
71 > "pac lntotal" "pac d.lntotal", scheme(slmono)

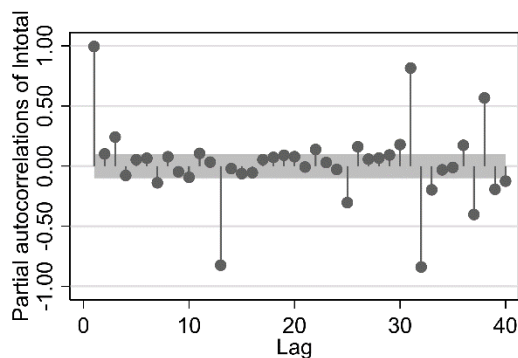
```



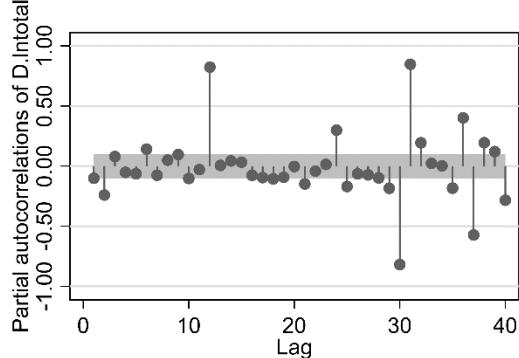
Bartlett's formula for MA(q) 95% confidence bands



Bartlett's formula for MA(q) 95% confidence bands



95% Confidence bands [se = 1/sqrt(n)]



95% Confidence bands [se = 1/sqrt(n)]

```

72
73 50 . dfuller lntotal, trend regress lag(12)
74 Augmented Dickey-Fuller test for unit root           Number of obs   =       362
75 ----- Interpolated Dickey-Fuller -----
76               Test               1% Critical      5% Critical      10% Critical
77               Statistic            Value            Value            Value
78 -----
79 Z(t)                -2.647             -3.986             -3.426             -3.130
80 -----
81 MacKinnon approximate p-value for Z(t) = 0.2586
82 (Regression output omitted)
83

```

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Part 2: FDL Model Estimates and Hypothesis Tests

```
54 . *Measuring association with total employment
55 .
56 . *Model 1
57 . reg total l(0/3,12,24).construct l(0/3,12,24).leisure ///
58 . > l(0/3,12,24).manufacture i.month
```

Source	SS	df	MS	Number of obs	=	351
Model	265592296	29	9158355.03	F(29, 321)	=	736.14
Residual	3993588.76	321	12441.0865	Prob > F	=	0.0000
Total	269585884	350	770245.384	R-squared	=	0.9852
				Adj R-squared	=	0.9838
				Root MSE	=	111.54

total	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
construct						
--.	4.230889	1.83853	2.30	0.022	.6137984	7.847979
L1.	-.3606925	2.49209	-0.14	0.885	-5.263584	4.542199
L2.	.192429	2.483735	0.08	0.938	-4.694026	5.078884
L3.	-.4311496	2.030757	-0.21	0.832	-4.426425	3.564125
L12.	-.5409481	.8517504	-0.64	0.526	-2.216666	1.13477
L24.	-.3110927	.4762232	-0.65	0.514	-1.248006	.6258202
leisure						
--.	2.660934	.316158	8.42	0.000	2.038931	3.282937
L1.	-.2891917	.4775595	-0.61	0.545	-1.228734	.6503502
L2.	.0970632	.467344	0.21	0.836	-.8223808	1.016507
L3.	-.1813559	.3350252	-0.54	0.589	-.8404783	.4777665
L12.	1.094327	.6454809	1.70	0.091	-.1755801	2.364235
L24.	.9614486	.610144	1.58	0.116	-.2389375	2.161835
manufacture						
--.	-11.43241	4.843606	-2.36	0.019	-20.96163	-1.90319
L1.	4.860474	7.256912	0.67	0.503	-9.416643	19.13759
L2.	-1.419159	7.201243	-0.20	0.844	-15.58675	12.74844
L3.	3.891607	5.302483	0.73	0.464	-6.540401	14.32362
L12.	3.743727	1.806043	2.07	0.039	.1905509	7.296904
L24.	-1.660536	1.076983	-1.54	0.124	-3.779372	.4583005

***month indicators and constant omitted

```
58 . bgodfrey , lags(12)
Breusch-Godfrey LM test for autocorrelation
```

lags (p)	chi2	df	Prob > chi2
12	341.333	12	0.0000

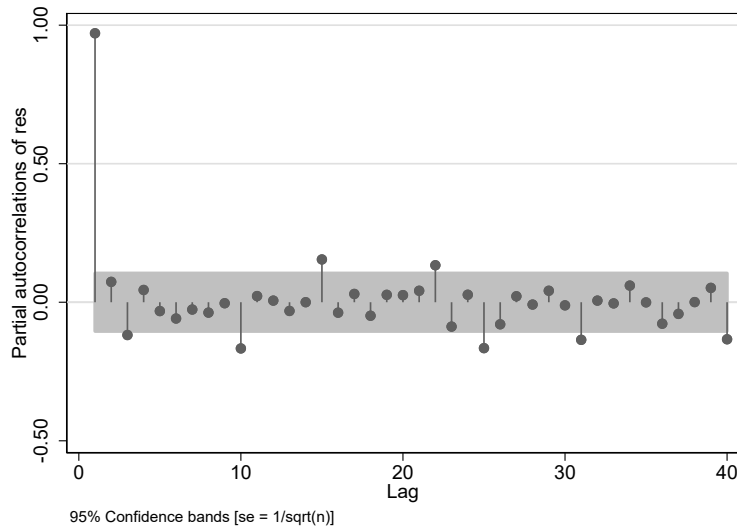
H0: no serial correlation

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```

133 59 . predict res, residual
134    (24 missing values generated)
135 60 . pac res, scheme(slmono) ylab(, grid) saving(respac1, replace)
136    (file respac1.gph saved)

```



```

137 62 . test l12.construct l24.construct l12.leisure l24.leisure ///
138     >      l12.manufacture l24.manufacture
139     ( 1)  L12.construct = 0
140     ( 2)  L24.construct = 0
141     ( 3)  L12.leisure = 0
142     ( 4)  L24.leisure = 0
143     ( 5)  L12.manufacture = 0
144     ( 6)  L24.manufacture = 0
145           F( 6, 321) = 64.43
146           Prob > F = 0.0000
147
148 63 . test construct+l1.construct+l2.construct+l3.construct ///
149     >      +l12.construct+l24.construct = ///
150     >      leisure+l1.leisure+l2.leisure+l3.leisure ///
151     >      +l12.leisure+l24.leisure
152     ( 1)  construct + L.construct + L2.construct + L3.construct + L12.construct +
153           L24.construct - leisure - L.leisure - L2.leisure - L3.leisure -
154           L12.leisure - L24.leisure = 0
155           F( 1, 321) = 61.13
156           Prob > F = 0.0000
157
158 64 . test construct+l1.construct+l2.construct+l3.construct ///
159     >      +l12.construct+l24.construct = ///
160     >      manufacture+l1.manufacture+l2.manufacture+l3.manufacture ///
161     >      +l12.manufacture+l24.manufacture
162     ( 1)  construct + L.construct + L2.construct + L3.construct + L12.construct +
163           L24.construct - manufacture - L.manufacture - L2.manufacture -
164           L3.manufacture - L12.manufacture - L24.manufacture = 0
165           F( 1, 321) = 296.24
166           Prob > F = 0.0000
167
168

```

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```
169 65 . test leisure+l1.leisure+l2.leisure+l3.leisure ///
170 >                                     +l12.construct+l24.leisure = ///
171 >                                     manufacture+l1.manufacture+l2.manufacture+l3.manufacture ///
172 >                                     +l12.manufacture+l24.manufacture
173 ( 1)  L12.construct + leisure + L.leisure + L2.leisure + L3.leisure +
174       L24.leisure - manufacture - L.manufacture - L2.manufacture -
175       L3.manufacture - L12.manufacture - L24.manufacture = 0
176 F( 1, 321) = 15.61
177 Prob > F = 0.0001
178
```

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67 . ***Model 2**

```
68 . reg d.total l(0/3,12,24)d.construct l(0/3,12,24)d.leisure ///
> l(0/3,12,24)d.manufacture i.month
```

Source	SS	df	MS	Number of obs = 350		
				F(29, 320) = 774.79		
Model	2534138.71	29	87384.0934	Prob > F = 0.0000		
Residual	36091.0739	320	112.784606	R-squared = 0.9860		
				Adj R-squared = 0.9847		
Total	2570229.78	349	7364.55525	Root MSE = 10.62		
D.total	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
construct						
D1.	2.263713	.1813442	12.48	0.000	1.906935	2.62049
LD.	-.3117216	.1558104	-2.00	0.046	-.6182638	-.0051794
L2D.	-.2102758	.1596913	-1.32	0.189	-.5244532	.1039016
L3D.	.3698995	.1858481	1.99	0.047	.0042611	.7355379
L12D.	-.0620967	.2105853	-0.29	0.768	-.4764033	.3522098
L24D.	.0913762	.1846376	0.49	0.621	-.2718808	.4546332
leisure						
D1.	1.889966	.0310477	60.87	0.000	1.828883	1.95105
LD.	-.0197171	.0300858	-0.66	0.513	-.0789079	.0394738
L2D.	.0815219	.0299585	2.72	0.007	.0225814	.1404625
L3D.	-.1087026	.0310277	-3.50	0.001	-.1697467	-.0476585
L12D.	.1182207	.1305274	0.91	0.366	-.1385795	.375021
L24D.	.0055953	.1398566	0.04	0.968	-.2695593	.2807498
manufacture						
D1.	3.570237	.4729717	7.55	0.000	2.63971	4.500764
LD.	.4597523	.4538348	1.01	0.312	-.4331246	1.352629
L2D.	-1.719207	.4509196	-3.81	0.000	-2.606348	-.8320653
L3D.	.9650117	.4861932	1.98	0.048	.0084729	1.921551
L12D.	.0974399	.4561772	0.21	0.831	-.8000454	.9949252
L24D.	.1393319	.4213618	0.33	0.741	-.6896574	.9683212
***month indicators and constant omitted for space						

69 . bgodfrey , lags(12)

Breusch-Godfrey LM test for autocorrelation

lags (p)	chi2	df	Prob > chi2

12	56.545	12	0.0000

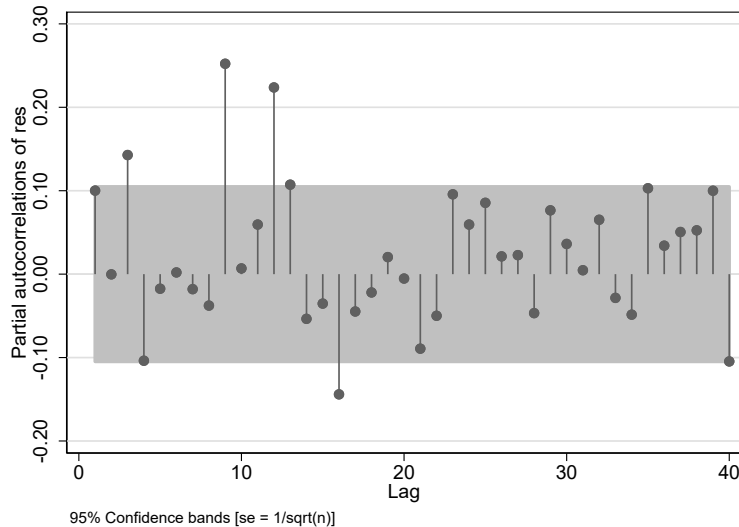
H0: no serial correlation

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```

226 70 . predict res, residual
227    (25 missing values generated)
228 71 . pac res, scheme(slmono) ylab(, grid) saving(respac2, replace)
229    (file respac2.gph saved)

```



```

230
231
232 73 . test l12d.construct l24d.construct l12d.leisure l24d.leisure ///
233     >      l12d.manufacture l24d.manufacture
234     ( 1)  L12D.construct = 0
235     ( 2)  L24D.construct = 0
236     ( 3)  L12D.leisure = 0
237     ( 4)  L24D.leisure = 0
238     ( 5)  L12D.manufacture = 0
239     ( 6)  L24D.manufacture = 0
240           F( 6, 320) = 0.46
241           Prob > F = 0.8412
242
243 74 . test d.construct+l1d.construct+l2d.construct+l3d.construct ///
244     >      +l12d.construct+l24d.construct = ///
245     >      d.leisure+l1d.leisure+l2d.leisure+l3d.leisure ///
246     >      +l12d.leisure+l24d.leisure
247     ( 1)  D.construct + LD.construct + L2D.construct + L3D.construct +
248           L12D.construct + L24D.construct - D.leisure - LD.leisure - L2D.leisure -
249           L3D.leisure - L12D.leisure - L24D.leisure = 0
250           F( 1, 320) = 0.31
251           Prob > F = 0.5775
252
253 75 . test d.construct+l1d.construct+l2d.construct+l3d.construct ///
254     >      +l12d.construct+l24d.construct = ///
255     >      d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture ///
256     >      +l12d.manufacture+l24d.manufacture
257     ( 1)  D.construct + LD.construct + L2D.construct + L3D.construct +
258           L12D.construct + L24D.construct - D.manufacture - LD.manufacture -
259           L2D.manufacture - L3D.manufacture - L12D.manufacture - L24D.manufacture
260           = 0
261           F( 1, 320) = 2.45
262           Prob > F = 0.1188
263
264 76 . test d.leisure+l1d.leisure+l2d.leisure+l3d.leisure ///

```


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```
265 >                                     +l12d.construct+l24d.leisure = ///
266 >                               d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture ///
267 >                                     +l12d.manufacture+l24d.manufacture
268 ( 1) L12D.construct + D.leisure + LD.leisure + L2D.leisure + L3D.leisure +
269      L24D.leisure - D.manufacture - LD.manufacture - L2D.manufacture -
270      L3D.manufacture - L12D.manufacture - L24D.manufacture = 0
271 F( 1, 320) = 4.68
272 Prob > F = 0.0313
273
```

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```

78 . *Model 3
79 . reg total l(0/3).construct l(0/3).leisure ///
>      l(0/3).manufacture i.month

```

Source	SS	df	MS	Number of obs	=	372
Model	325584992	23	14155869.2	F(23, 348)	=	505.40
Residual	9747294.08	348	28009.4658	Prob > F	=	0.0000
Total	335332286	371	903860.609	R-squared	=	0.9709
				Adj R-squared	=	0.9690
				Root MSE	=	167.36

	total	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
construct						
--.		4.284118	2.434234	1.76	0.079	-.5035442 9.07178
L1.		-.7992485	3.704152	-0.22	0.829	-8.08459 6.486093
L2.		1.782016	3.673335	0.49	0.628	-5.442715 9.006746
L3.		-1.608777	2.460026	-0.65	0.514	-6.447166 3.229613
leisure						
--.		2.404328	.4462006	5.39	0.000	1.526739 3.281918
L1.		.2244156	.6780477	0.33	0.741	-1.109172 1.558003
L2.		.0750189	.6689735	0.11	0.911	-1.240721 1.390759
L3.		1.146822	.4434149	2.59	0.010	.2747118 2.018932
manufacture						
--.		-.6244998	6.481029	-0.10	0.923	-13.37141 12.12241
L1.		.8454984	9.802269	0.09	0.931	-18.43365 20.12464
L2.		-2.188272	9.825885	-0.22	0.824	-21.51386 17.13732
L3.		-1.101715	6.463765	-0.17	0.865	-13.81468 11.61125

***month indicators and constant dropped for space


```

80 . bgodfrey , lags(12)
Breusch-Godfrey LM test for autocorrelation

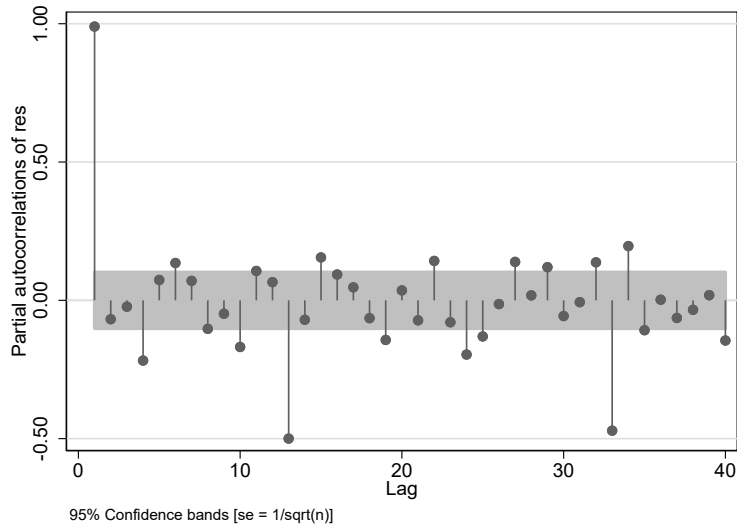
```

lags (p)	chi2	df	Prob > chi2
12	359.040	12	0.0000

H0: no serial correlation

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```
314 81 . predict res, residual
315    (3 missing values generated)
316 82 . pac res, scheme(slmono) ylab(, grid) saving(respac3, replace)
317    (file respac3.gph saved)
```



```
318
319
320 84 . test construct+l1.construct+l2.construct+l3.construct = ///
321    >          leisure+l1.leisure+l2.leisure+l3.leisure
322    ( 1)  construct + L.construct + L2.construct + L3.construct - leisure -
323          L.leisure - L2.leisure - L3.leisure = 0
324          F( 1, 348) = 0.87
325          Prob > F = 0.3512
326
327 85 . test construct+l1.construct+l2.construct+l3.construct = ///
328    >          manufacture+l1.manufacture+l2.manufacture+l3.manufacture
329    ( 1)  construct + L.construct + L2.construct + L3.construct - manufacture -
330          L.manufacture - L2.manufacture - L3.manufacture = 0
331          F( 1, 348) = 452.26
332          Prob > F = 0.0000
333
334 86 . test leisure+l1.leisure+l2.leisure+l3.leisure = ///
335    >          manufacture+l1.manufacture+l2.manufacture+l3.manufacture
336    ( 1)  leisure + L.leisure + L2.leisure + L3.leisure - manufacture -
337          L.manufacture - L2.manufacture - L3.manufacture = 0
338          F( 1, 348) = 1692.71
339          Prob > F = 0.0000
340
```

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```

88 . *Model 4
89 . reg d.total l(0/3)d.construct l(0/3)d.leisure ///
    >      l(0/3)d.manufacture i.month

```

Source	SS	df	MS	Number of obs	=	371
Model	2566126.68	23	111570.725	F(23, 347)	=	916.96
Residual	42220.9195	347	121.67412	Prob > F	=	0.0000
				R-squared	=	0.9838
				Adj R-squared	=	0.9827
Total	2608347.6	370	7049.58811	Root MSE	=	11.031

D.total	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
construct					
D1.	2.332968	.1793352	13.01	0.000	1.980247 2.685689
LD.	-.3335641	.1596781	-2.09	0.037	-.6476228 -.0195054
L2D.	-.2463294	.1628008	-1.51	0.131	-.56653 .0738712
L3D.	.427257	.1791037	2.39	0.018	.0749916 .7795225
leisure					
D1.	1.918943	.0308204	62.26	0.000	1.858325 1.979561
LD.	-.0249597	.0295956	-0.84	0.400	-.083169 .0332495
L2D.	.0654544	.0294462	2.22	0.027	.0075389 .1233699
L3D.	-.0967785	.0299684	-3.23	0.001	-.155721 -.037836
manufacture					
D1.	2.912126	.4489113	6.49	0.000	2.029196 3.795055
LD.	.5719183	.4221478	1.35	0.176	-.2583721 1.402209
L2D.	-1.269769	.4242204	-2.99	0.003	-2.104136 -.4354026
L3D.	.6268801	.4477979	1.40	0.162	-.2538597 1.50762

***Month indicators and constant omitted for space


```

90 . bgodfrey , lags(12)
    Breusch-Godfrey LM test for autocorrelation

```

lags(p)	chi2	df	Prob > chi2
12	69.546	12	0.0000

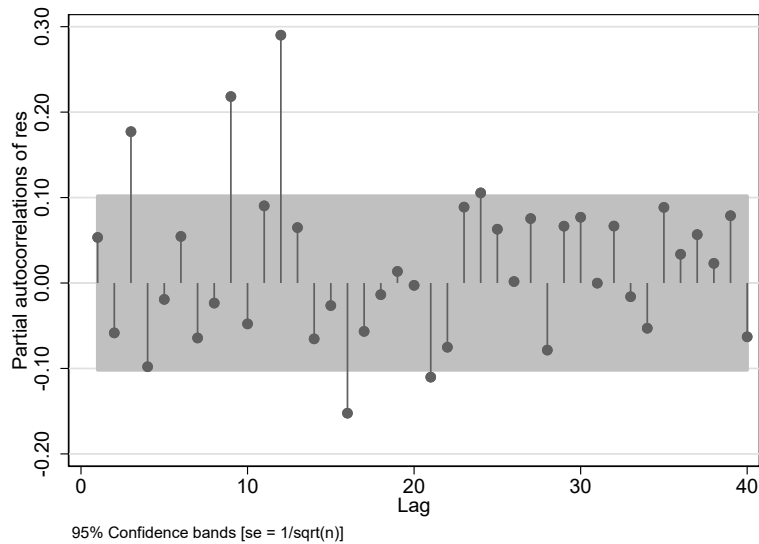
H0: no serial correlation

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```

383 91 . predict res, residual
384    (4 missing values generated)
385 92 . pac res, scheme(slmono) ylab(, grid) saving(respac4, replace)
386    (file respac4.gph saved)

```



```

387
388
389 94 . test d.construct+l1d.construct+l2d.construct+l3d.construct = ///
390 >          d.leisure+l1d.leisure+l2d.leisure+l3d.leisure
391 ( 1) D.construct + LD.construct + L2D.construct + L3D.construct - D.leisure -
392      LD.leisure - L2D.leisure - L3D.leisure = 0
393      F( 1, 347) = 2.08
394      Prob > F = 0.1503
395
396 95 . test d.construct+l1d.construct+l2d.construct+l3d.construct = ///
397 >          d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture
398 ( 1) D.construct + LD.construct + L2D.construct + L3D.construct -
399      D.manufacture - LD.manufacture - L2D.manufacture - L3D.manufacture = 0
400      F( 1, 347) = 0.72
401      Prob > F = 0.3966
402
403 96 . test d.leisure+l1d.leisure+l2d.leisure+l3d.leisure = ///
404 >          d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture
405 ( 1) D.leisure + LD.leisure + L2D.leisure + L3D.leisure - D.manufacture -
406      LD.manufacture - L2D.manufacture - L3D.manufacture = 0
407      F( 1, 347) = 2.42
408      Prob > F = 0.1205
409

```

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```

410 99 . *Model 5
411 100 . newey total l(0/3,12,24).construct l(0/3,12,24).leisure ///
412 >      l(0/3,12,24).manufacture i.month, lag(12)
413
414 Regression with Newey-West standard errors      Number of obs      =      351
415 maximum lag: 12                                F( 29,          321) =      162.07
416                                              Prob > F          =      0.0000
417 -----
418               |               Newey-West
419      total |      Coef.   Std. Err.      t    P>|t|      [95% Conf. Interval]
420 -----+-----
421      construct |
422      --. |      4.230889   1.56265     2.71   0.007     1.156559     7.305218
423      L1. |     -.3606925   .7044518    -0.51   0.609    -1.746618     1.025233
424      L2. |      .192429   .7423976     0.26   0.796    -1.268151     1.653009
425      L3. |     -.4311496   1.63607    -0.26   0.792    -3.649923     2.787624
426      L12. |    -.5409481   1.318281    -0.41   0.682    -3.13451     2.052614
427      L24. |    -.3110927   .8332526    -0.37   0.709    -1.950419     1.328233
428
429      leisure |
430      --. |      2.660934   .3161085     8.42   0.000     2.039028     3.28284
431      L1. |     -.2891917   .1497653    -1.93   0.054    -.5838373     .0054539
432      L2. |      .0970632   .1369702     0.71   0.479    -.1724094     .3665358
433      L3. |     -.1813559   .235651    -0.77   0.442    -.6449714     .2822595
434      L12. |      1.094327   1.023291     1.07   0.286    -.9188761     3.107531
435      L24. |      .9614486   1.008107     0.95   0.341    -1.021882     2.944779
436
437      manufacture |
438      --. |     -11.43241   6.103449    -1.87   0.062    -23.44023     .5754018
439      L1. |      4.860474   2.679511     1.81   0.071    -.4111474    10.13209
440      L2. |     -1.419159   2.902281    -0.49   0.625    -7.129054     4.290737
441      L3. |      3.891607   5.236452     0.74   0.458    -6.410494    14.19371
442      L12. |      3.743727   3.213622     1.16   0.245    -2.578693    10.06615
443      L24. |     -1.660536   2.140912    -0.78   0.439    -5.872527     2.551455
444      ***Month indicators and constant omitted for space
445 -----
446
447 ****Note bgodfrey test and residual pac same as model 1
448
449 102 . test l12.construct l24.construct l12.leisure l24.leisure ///
450 >      l12.manufacture l24.manufacture
451 ( 1)  L12.construct = 0
452 ( 2)  L24.construct = 0
453 ( 3)  L12.leisure = 0
454 ( 4)  L24.leisure = 0
455 ( 5)  L12.manufacture = 0
456 ( 6)  L24.manufacture = 0
457      F( 6, 321) = 84.75
458      Prob > F = 0.0000
459

```

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```
460 103 . test construct+l1.construct+l2.construct+l3.construct ///
461 >                                     +l12.construct+l24.construct = ///
462 >                                     leisure+l1.leisure+l2.leisure+l3.leisure ///
463 >                                     +l12.leisure+l24.leisure
464 ( 1) construct + L.construct + L2.construct + L3.construct + L12.construct +
465 L24.construct - leisure - L.leisure - L2.leisure - L3.leisure -
466 L12.leisure - L24.leisure = 0
467 F( 1, 321) = 13.11
468 Prob > F = 0.0003
469
470 104 . test construct+l1.construct+l2.construct+l3.construct ///
471 >                                     +l12.construct+l24.construct = ///
472 >                                     manufacture+l1.manufacture+l2.manufacture+l3.manufacture ///
473 >                                     +l12.manufacture+l24.manufacture
474 ( 1) construct + L.construct + L2.construct + L3.construct + L12.construct +
475 L24.construct - manufacture - L.manufacture - L2.manufacture -
476 L3.manufacture - L12.manufacture - L24.manufacture = 0
477 F( 1, 321) = 34.68
478 Prob > F = 0.0000
479
480 105 . test leisure+l1.leisure+l2.leisure+l3.leisure ///
481 >                                     +l12.construct+l24.leisure = ///
482 >                                     manufacture+l1.manufacture+l2.manufacture+l3.manufacture ///
483 >                                     +l12.manufacture+l24.manufacture
484 ( 1) L12.construct + leisure + L.leisure + L2.leisure + L3.leisure +
485 L24.leisure - manufacture - L.manufacture - L2.manufacture -
486 L3.manufacture - L12.manufacture - L24.manufacture = 0
487 F( 1, 321) = 7.76
488 Prob > F = 0.0057
489
```

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```

107 . *Model 6
108 . newey d.total l(0/3,12,24)d.construct l(0/3,12,24)d.leisure ///
    >      l(0/3,12,24)d.manufacture i.month, lag(12)

Regression with Newey-West standard errors      Number of obs      =      350
maximum lag: 12                                F( 29,          320) =    30002.82
                                                Prob > F          =      0.0000

```

	D.total	Coef.	Newey-West Std. Err.	t	P> t	[95% Conf. Interval]	

construct							
D1.		2.263713	.3482382	6.50	0.000	1.578587	2.948838
LD.		-.3117216	.1228763	-2.54	0.012	-.5534691	-.0699741
L2D.		-.2102758	.1377784	-1.53	0.128	-.4813417	.0607901
L3D.		.3698995	.2966132	1.25	0.213	-.2136589	.9534578
L12D.		-.0620967	.2244674	-0.28	0.782	-.503715	.3795216
L24D.		.0913762	.1576012	0.58	0.562	-.2186892	.4014416
leisure							
D1.		1.889966	.0334457	56.51	0.000	1.824165	1.955767
LD.		-.0197171	.0220719	-0.89	0.372	-.0631414	.0237073
L2D.		.0815219	.0197417	4.13	0.000	.0426819	.1203619
L3D.		-.1087026	.0259012	-4.20	0.000	-.1596607	-.0577445
L12D.		.1182207	.1163835	1.02	0.310	-.1107527	.3471942
L24D.		.0055953	.1555835	0.04	0.971	-.3005005	.311691
manufacture							
D1.		3.570237	.7508257	4.76	0.000	2.093059	5.047416
LD.		.4597523	.4438433	1.04	0.301	-.4134673	1.332972
L2D.		-1.719207	.4264282	-4.03	0.000	-2.558164	-.8802499
L3D.		.9650117	.5136259	1.88	0.061	-.0454983	1.975522
L12D.		.0974399	.5164171	0.19	0.850	-.9185617	1.113441
L24D.		.1393319	.571091	0.24	0.807	-.9842354	1.262899
*Month indicators and constant omitted for space							

Note: *bgodfrey test and residual pac same as model 2

```

110 . test l12d.construct l24d.construct l12d.leisure l24d.leisure ///
    >      l12d.manufacture l24d.manufacture
    ( 1)  L12D.construct = 0
    ( 2)  L24D.construct = 0
    ( 3)  L12D.leisure = 0
    ( 4)  L24D.leisure = 0
    ( 5)  L12D.manufacture = 0
    ( 6)  L24D.manufacture = 0
    F( 6, 320) = 0.66
    Prob > F = 0.6830

```


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```
541 111 . test d.construct+l1d.construct+l2d.construct+l3d.construct ///
542 >                                     +l12d.construct+l24d.construct = ///
543 >                                     d.leisure+l1d.leisure+l2d.leisure+l3d.leisure ///
544 >                                     +l12d.leisure+l24d.leisure
545 ( 1) D.construct + LD.construct + L2D.construct + L3D.construct +
546      L12D.construct + L24D.construct - D.leisure - LD.leisure - L2D.leisure -
547      L3D.leisure - L12D.leisure - L24D.leisure = 0
548      F( 1, 320) = 0.32
549      Prob > F = 0.5745
550
551 112 . test d.construct+l1d.construct+l2d.construct+l3d.construct ///
552 >                                     +l12d.construct+l24d.construct = ///
553 >                                     d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture ///
554 >                                     +l12d.manufacture+l24d.manufacture
555 ( 1) D.construct + LD.construct + L2D.construct + L3D.construct +
556      L12D.construct + L24D.construct - D.manufacture - LD.manufacture -
557      L2D.manufacture - L3D.manufacture - L12D.manufacture - L24D.manufacture
558      = 0
559      F( 1, 320) = 3.29
560      Prob > F = 0.0704
561
562 113 . test d.leisure+l1d.leisure+l2d.leisure+l3d.leisure ///
563 >                                     +l12d.construct+l24d.leisure = ///
564 >                                     d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture ///
565 >                                     +l12d.manufacture+l24d.manufacture
566 ( 1) L12D.construct + D.leisure + LD.leisure + L2D.leisure + L3D.leisure +
567      L24D.leisure - D.manufacture - LD.manufacture - L2D.manufacture -
568      L3D.manufacture - L12D.manufacture - L24D.manufacture = 0
569      F( 1, 320) = 4.86
570      Prob > F = 0.0282
571
```

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```

115 . *Model 7
116 . newey total l(0/3).construct l(0/3).leisure ///
    >      l(0/3).manufacture i.month, lag(12)

Regression with Newey-West standard errors      Number of obs      =      372
maximum lag: 12                                F( 23,          348) =      142.94
                                                Prob > F          =      0.0000

```

		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	

total							
construct							
--.		4.284118	2.628942	1.63	0.104	-.886497	9.454733
L1.		-.7992485	1.234697	-0.65	0.518	-3.227656	1.629159
L2.		1.782016	2.044188	0.87	0.384	-2.238502	5.802533
L3.		-1.608777	2.4968	-0.64	0.520	-6.519493	3.30194
leisure							
--.		2.404328	.5453794	4.41	0.000	1.331674	3.476983
L1.		.2244156	.2704854	0.83	0.407	-.3075763	.7564075
L2.		.0750189	.3891887	0.19	0.847	-.6904391	.8404769
L3.		1.146822	.4752159	2.41	0.016	.2121654	2.081479
manufacture							
--.		-.6244998	9.911448	-0.06	0.950	-20.11838	18.86938
L1.		.8454984	3.572977	0.24	0.813	-6.181848	7.872844
L2.		-2.188272	4.168208	-0.52	0.600	-10.38632	6.009777
L3.		-1.101715	8.640158	-0.13	0.899	-18.09521	15.89178

***Month indicators and constant omitted for space

*Note bgodfrey test and residual pac same as model 3

```

118 . test construct+l1.construct+l2.construct+l3.construct = ///
    >      leisure+l1.leisure+l2.leisure+l3.leisure
    ( 1)  construct + L.construct + L2.construct + L3.construct - leisure -
          L.leisure - L2.leisure - L3.leisure = 0
          F( 1, 348) = 0.05
          Prob > F = 0.8314

119 . test construct+l1.construct+l2.construct+l3.construct = ///
    >      manufacture+l1.manufacture+l2.manufacture+l3.manufacture
    ( 1)  construct + L.construct + L2.construct + L3.construct - manufacture -
          L.manufacture - L2.manufacture - L3.manufacture = 0
          F( 1, 348) = 25.24
          Prob > F = 0.0000

120 . test leisure+l1.leisure+l2.leisure+l3.leisure = ///
    >      manufacture+l1.manufacture+l2.manufacture+l3.manufacture
    ( 1)  leisure + L.leisure + L2.leisure + L3.leisure - manufacture -
          L.manufacture - L2.manufacture - L3.manufacture = 0
          F( 1, 348) = 175.58
          Prob > F = 0.0000

```

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```

122 . *Model 8
123 . newey d.total l(0/3)d.construct l(0/3)d.leisure ///
    >      l(0/3)d.manufacture i.month, lag(12)

Regression with Newey-West standard errors      Number of obs      =      371
maximum lag: 12                                F( 23,          347) =    24120.27
                                                Prob > F          =      0.0000

```

		Newey-West					
D.total		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
construct							
	D1.	2.332968	.3545379	6.58	0.000	1.635654	3.030282
	LD.	-.3335641	.1285227	-2.60	0.010	-.5863456	-.0807826
	L2D.	-.2463294	.1450092	-1.70	0.090	-.531537	.0388782
	L3D.	.427257	.2822514	1.51	0.131	-.1278818	.9823959
leisure							
	D1.	1.918943	.0379202	50.60	0.000	1.844361	1.993525
	LD.	-.0249597	.0230453	-1.08	0.280	-.0702859	.0203664
	L2D.	.0654544	.0227607	2.88	0.004	.0206881	.1102207
	L3D.	-.0967785	.0247239	-3.91	0.000	-.1454061	-.048151
manufacture							
	D1.	2.912126	.8112745	3.59	0.000	1.316492	4.50776
	LD.	.5719183	.4570086	1.25	0.212	-.3269372	1.470774
	L2D.	-1.269769	.4716883	-2.69	0.007	-2.197497	-.3420415
	L3D.	.6268801	.5201979	1.21	0.229	-.3962576	1.650018

*Month indicators and constant dropped for space

```

124 . *bgodfrey test and residual pac same as model 4
125 . test d.construct+l1d.construct+l2d.construct+l3d.construct = ///
    >      d.leisure+l1d.leisure+l2d.leisure+l3d.leisure
    ( 1)  D.construct + LD.construct + L2D.construct + L3D.construct - D.leisure -
          LD.leisure - L2D.leisure - L3D.leisure = 0
          F( 1, 347) = 1.39
          Prob > F = 0.2385

126 . test d.construct+l1d.construct+l2d.construct+l3d.construct = ///
    >      d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture
    ( 1)  D.construct + LD.construct + L2D.construct + L3D.construct -
          D.manufacture - LD.manufacture - L2D.manufacture - L3D.manufacture = 0
          F( 1, 347) = 0.70
          Prob > F = 0.4040

127 . test d.leisure+l1d.leisure+l2d.leisure+l3d.leisure = ///
    >      d.manufacture+l1d.manufacture+l2d.manufacture+l3d.manufacture
    ( 1)  D.leisure + LD.leisure + L2D.leisure + L3D.leisure - D.manufacture -
          LD.manufacture - L2D.manufacture - L3D.manufacture = 0
          F( 1, 347) = 2.33
          Prob > F = 0.1275

```

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Part 3: Forecast Model Estimation

Model numbers start again at 1. They models differ from the previous section.

```
138 . *Model 1
```

```
139 . reg lntotal l(1/3,12,24).lntotal l(1/3,12,24).lnconstruct ///
> l(1/3,12,24).lnleisure l(1/3,12,24).lnmanufacture i.month if tin(1992m1, )
```

Source	SS	df	MS	Number of obs	=	351
-----+-----				F(31, 319)	=	2723.13
Model	7.31919963	31	.236103214	Prob > F	=	0.0000
Residual	.02765821	319	.000086703	R-squared	=	0.9962
-----+-----				Adj R-squared	=	0.9959
Total	7.34685784	350	.020991022	Root MSE	=	.00931

lntotal	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
-----+-----						
lntotal						
L1.	1.001052	.2830059	3.54	0.000	.4442582	1.557846
L2.	-.029382	.3770348	-0.08	0.938	-.7711709	.7124069
L3.	.032478	.310293	0.10	0.917	-.5780013	.6429572
L12.	.0564417	.159502	0.35	0.724	-.2573671	.3702504
L24.	-.0618159	.1159579	-0.53	0.594	-.2899548	.1663229
lnconstruct						
L1.	-.0445404	.0865474	-0.51	0.607	-.2148162	.1257354
L2.	.026441	.1256772	0.21	0.833	-.2208199	.2737019
L3.	.0299497	.0925456	0.32	0.746	-.1521271	.2120265
L12.	.0327269	.0416369	0.79	0.432	-.0491907	.1146445
L24.	-.0516086	.0259511	-1.99	0.048	-.1026656	-.0005516
lnleisure						
L1.	-.0602442	.0726378	-0.83	0.408	-.2031539	.0826655
L2.	-.0114932	.0942923	-0.12	0.903	-.1970065	.1740201
L3.	.0212937	.0802812	0.27	0.791	-.1366537	.1792412
L12.	-.0457831	.0670301	-0.68	0.495	-.1776601	.0860938
L24.	.0750456	.0629298	1.19	0.234	-.0487643	.1988556
lnmanufacture						
L1.	.1234632	.2039634	0.61	0.545	-.2778202	.5247466
L2.	-.1803586	.2993799	-0.60	0.547	-.7693671	.4086499
L3.	.0529805	.2163984	0.24	0.807	-.3727678	.4787289
L12.	-.0825586	.0726845	-1.14	0.257	-.2255602	.060443
L24.	.0622011	.047107	1.32	0.188	-.0304785	.1548807
***Month indicators and constant omitted for space						

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```

722 140 . estat ic
723
724 Akaike's information criterion and Bayesian information criterion
725 -----
726 Model | Obs ll(null) ll(model) df AIC BIC
727 -----+-----
728 . | 351 180.5257 1160.185 32 -2256.37 -2132.825
729 -----
730 Note: N=Obs used in calculating BIC; see [R] BIC note.
731
732 141 . scalar dfl=el(r(S),1,4)
733 142 . scalar aic1=el(r(S),1,5)
734
735 143 . loocv reg lntotal l(1/3,12,24).lntotal l(1/3,12,24).lnconstruct ///
736 > l(1/3,12,24).lnleisure l(1/3,12,24).lnmanufacture i.month if tin(1992m1, )
737
738 Leave-One-Out Cross-Validation Results
739 -----
740 Method | Value
741 -----+-----
742 Root Mean Squared Errors | .01274467
743 Mean Absolute Errors | .00420641
744 Pseudo-R2 | .98914561
745 -----
746
747 144 . scalar loormsel=r(rmse)
748

```

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```

146 . *Model 2
147 . reg lntotal l(1/3).lntotal l(1/3).lnconstruct l(1/3).lnleisure ///
148 > l(1/3).lnmanufacture i.month if tin(1992m1, )

```

Source	SS	df	MS	Number of obs	=	351
Model	7.31742862	23	.31814907	F(23, 327)	=	3535.08
Residual	.029429224	327	.000089998	Prob > F	=	0.0000
				R-squared	=	0.9960
				Adj R-squared	=	0.9957
Total	7.34685784	350	.020991022	Root MSE	=	.00949

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lntotal					
L1.	1.013301	.286538	3.54	0.000	.4496104 1.576991
L2.	-.0039268	.3838259	-0.01	0.992	-.7590066 .7511529
L3.	.0183491	.2873701	0.06	0.949	-.5469783 .5836765
lnconstruct					
L1.	.0482091	.0827167	0.58	0.560	-.114515 .2109332
L2.	.0217284	.1278382	0.17	0.865	-.2297606 .2732175
L3.	-.0749122	.0829936	-0.90	0.367	-.238181 .0883566
lnleisure					
L1.	-.0828165	.0730519	-1.13	0.258	-.2265275 .0608946
L2.	-.009183	.0960332	-0.10	0.924	-.1981038 .1797378
L3.	.0563436	.0731265	0.77	0.442	-.0875141 .2002013
lnmanufacture					
L1.	.2559934	.1936545	1.32	0.187	-.1249725 .6369593
L2.	-.1772639	.3041304	-0.58	0.560	-.7755629 .4210351
L3.	-.0842329	.1956971	-0.43	0.667	-.4692171 .3007512

*Month indicators and constant omitted for space


```

148 . estat ic
149 Akaike's information criterion and Bayesian information criterion

```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	351	180.5257	1149.293	24	-2250.585	-2157.926

Note: N=Obs used in calculating BIC; see [R] BIC note.

```

149 . scalar df2=el(r(S),1,4)
150 . scalar aic2=el(r(S),1,5)

```

Spring 2021 Time Series Final Exam – Output

```
151 . loocv reg lntotal l(1/3).lntotal l(1/3).lnconstruct l(1/3).lnleisure ///  
    >      l(1/3).lnmanufacture i.month if tin(1992m1, )
```

Leave-One-Out Cross-Validation Results

Method	Value
Root Mean Squared Errors	.0125165
Mean Absolute Errors	.00415991
Pseudo-R2	.99221929

```
152 . scalar loormse2=r(rmse)
```

Spring 2021 Time Series Final Exam – Output

```

811 154 . *Model 3
812 155 . reg lntotal l(1/3,12,24).lntotal i.month if tin(1992m1, )
813
814           Source |           SS           df           MS       Number of obs   =           351
815 -----+-----
816           Model |    7.31573167           16    .45723323       F(16, 334)       =    4906.35
817           Residual |    .03112617          334    .000093192       Prob > F         =     0.0000
818 -----+-----
819           Total |    7.34685784          350    .020991022       R-squared          =     0.9958
820                                     Adj R-squared       =     0.9956
821                                     Root MSE          =     .00965
822
823           lntotal |           Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
824 -----+-----
825           lntotal |
826             L1. |    .9598666     .0541003     17.74   0.000     .8534463     1.066287
827             L2. |   -.1288398     .0749965     -1.72   0.087    -.2763648     .0186852
828             L3. |    .1691786     .0574583      2.94   0.003     .0561529     .2822043
829             L12. |    .0298379     .041011      0.73   0.467    -.0508344     .1105103
830             L24. |   -.0394827     .0228986     -1.72   0.086    -.0845264     .005561
831 *Month indicators and constant omitted for space
832 -----+-----
833 156 . estat ic
834
835 Akaike's information criterion and Bayesian information criterion
836 -----+-----
837           Model |           Obs   ll(null)   ll(model)           df           AIC           BIC
838 -----+-----
839           . |           351   180.5257   1139.454           17   -2244.908   -2179.275
840 -----+-----
841 Note: N=Obs used in calculating BIC; see [R] BIC note.
842 157 . scalar df3=el(r(S),1,4)
843 158 . scalar aic3=el(r(S),1,5)
844
845 159 . loocv reg lntotal l(1/3,12,24).lntotal i.month if tin(1992m1, )
846
847 Leave-One-Out Cross-Validation Results
848 -----+-----
849           Method |           Value
850 -----+-----
851 Root Mean Squared Errors |    .01231975
852 Mean Absolute Errors |    .00419536
853 Pseudo-R2 |    .98985418
854 -----+-----
855
856 160 . scalar loormse3=r(rmse)
857
858

```


Spring 2021 Time Series Final Exam – Output

```

162 . *Model 4
163 . reg lntotal l(1/3).lntotal i.month if tin(1992m1, )

```

Source	SS	df	MS	Number of obs	=	351
Model	7.31519274	14	.522513767	F(14, 336)	=	5544.42
Residual	.031665099	336	.000094241	Prob > F	=	0.0000
				R-squared	=	0.9957
				Adj R-squared	=	0.9955
Total	7.34685784	350	.020991022	Root MSE	=	.00971

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lntotal						
l1.	.9738505	.0539538	18.05	0.000	.8677207	1.07998
l2.	-.1280694	.0754005	-1.70	0.090	-.276386	.0202472
l3.	.1456231	.0536477	2.71	0.007	.0400954	.2511507

*Month indicators and constant omitted for space

```

164 . estat ic
    Akaike's information criterion and Bayesian information criterion

```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	351	180.5257	1136.441	15	-2242.883	-2184.971

Note: N=Obs used in calculating BIC; see [R] BIC note.

```

165 . scalar df4=el(r(S),1,4)
166 . scalar aic4=el(r(S),1,5)
167 . loocv reg lntotal l(1/3).lntotal i.month if tin(1992m1, )

```

Leave-One-Out Cross-Validation Results

Method	Value
Root Mean Squared Errors	.01211767
Mean Absolute Errors	.0042613
Pseudo-R2	.99270491

```

168 . scalar loormse4=r(rmse)

```

Spring 2021 Time Series Final Exam – Output

```

170 . *Model 5
171 . reg d.lntotal l(1/3,12,24)d.lntotal l(1/3,12,24)d.lnconstruct ///
    > l(1/3,12,24)d.lnleisure l(1/3,12,24)d.lnmanufacture i.month if tin(1992m1, )

```

Source	SS	df	MS	Number of obs	=	350
Model	.025848897	31	.000833835	F(31, 318)	=	9.04
Residual	.029338055	318	.000092258	Prob > F	=	0.0000
				R-squared	=	0.4684
				Adj R-squared	=	0.4166
Total	.055186951	349	.000158129	Root MSE	=	.00961

D.lntotal	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lntotal					
LD.	.3297627	.2857661	1.15	0.249	-.2324684 .8919937
L2D.	.2607253	.2815539	0.93	0.355	-.2932185 .8146691
L3D.	.1808159	.3218863	0.56	0.575	-.4524798 .8141117
L12D.	.3560777	.3455776	1.03	0.304	-.3238296 1.035985
L24D.	.1785031	.3255253	0.55	0.584	-.4619524 .8189586
lnconstruct					
LD.	-.0193809	.0870135	-0.22	0.824	-.1905757 .1518139
L2D.	.0104321	.086415	0.12	0.904	-.1595852 .1804494
L3D.	-.0226003	.0918366	-0.25	0.806	-.2032843 .1580837
L12D.	.0179951	.10039	0.18	0.858	-.1795175 .2155076
L24D.	-.0681862	.0934837	-0.73	0.466	-.252111 .1157385
lnleisure					
LD.	-.1400856	.073353	-1.91	0.057	-.2844041 .004233
L2D.	-.129261	.0721985	-1.79	0.074	-.2713082 .0127861
L3D.	-.0869878	.0836036	-1.04	0.299	-.2514738 .0774982
L12D.	-.046059	.1450376	-0.32	0.751	-.3314134 .2392955
L24D.	.1341997	.1433461	0.94	0.350	-.1478269 .4162264
lnmanufacture					
LD.	.1032988	.2015463	0.51	0.609	-.2932338 .4998313
L2D.	-.1030094	.2041974	-0.50	0.614	-.5047578 .2987391
L3D.	.123798	.2086914	0.59	0.553	-.2867924 .5343884
L12D.	-.1155328	.1960862	-0.59	0.556	-.501323 .2702575
L24D.	-.1539416	.191246	-0.80	0.421	-.5302089 .2223257

*Month indicators and constant omitted for space


```

172 . estat ic
    Akaike's information criterion and Bayesian information criterion

```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	350	1035.49	1146.062	32	-2228.124	-2104.67

Note: N=Obs used in calculating BIC; see [R] BIC note.

```

173 . scalar df5=el(r(S),1,4)
174 . scalar aic5=el(r(S),1,5)

```

Spring 2021 Time Series Final Exam – Output

```
957 175 . loocv reg d.lntotal l(1/3,12,24)d.lntotal l(1/3,12,24)d.lnconstruct ///
958 > l(1/3,12,24)d.lnleisure l(1/3,12,24)d.lnmanufacture i.month if tin(1992m1, )
959
960 Leave-One-Out Cross-Validation Results
961 -----
962 Method | Value
963 -----+-----
964 Root Mean Squared Errors | .01737282
965 Mean Absolute Errors | .00446863
966 Pseudo-R2 | .04873923
967 -----
968
969 176 . scalar loormse5=r(rmse)
970
971
```

Spring 2021 Time Series Final Exam – Output

```

178 . *Model 6
179 . reg d.lntotal l(1/3)d.lntotal l(1/3)d.lnconstruct l(1/3)d.lnleisure ///
>      l(1/3)d.lnmanufacture i.month if tin(1992m1, )

```

Source	SS	df	MS	Number of obs	=	351
Model	.025514084	23	.001109308	F(23, 327)	=	12.10
Residual	.029972878	327	.00009166	Prob > F	=	0.0000
				R-squared	=	0.4598
				Adj R-squared	=	0.4218
Total	.055486962	350	.000158534	Root MSE	=	.00957

D.lntotal	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lntotal					
LD.	.3233011	.278917	1.16	0.247	-.225397 .8719991
L2D.	.251572	.277849	0.91	0.366	-.295025 .7981691
L3D.	.4544822	.2822541	1.61	0.108	-.1007809 1.009745
lnconstruct					
LD.	-.0138717	.0852908	-0.16	0.871	-.1816595 .1539162
L2D.	.0275572	.0851349	0.32	0.746	-.139924 .1950383
L3D.	-.0403021	.0851311	-0.47	0.636	-.2077758 .1271717
lnleisure					
LD.	-.1305357	.0715824	-1.82	0.069	-.2713558 .0102844
L2D.	-.1215742	.0712288	-1.71	0.089	-.2616987 .0185503
L3D.	-.1660704	.0720426	-2.31	0.022	-.3077959 -.0243449
lnmanufacture					
LD.	.0452812	.1953388	0.23	0.817	-.338998 .4295604
L2D.	-.1400622	.1984901	-0.71	0.481	-.5305408 .2504165
L3D.	.111119	.2011779	0.55	0.581	-.2846472 .5068852

*Month indicators and constant omitted for space


```

180 . estat ic
Akaike's information criterion and Bayesian information criterion

```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	351	1037.998	1146.08	24	-2244.16	-2151.502

Note: N=Obs used in calculating BIC; see [R] BIC note.

```

181 . scalar df6=el(r(S),1,4)
182 . scalar aic6=el(r(S),1,5)

```

Spring 2021 Time Series Final Exam – Output

```
183 . loocv reg d.lntotal l(1/3)d.lntotal l(1/3)d.lnconstruct l(1/3)d.lnleisure ///
>      l(1/3)d.lnmanufacture i.month if tin(1992m1, )
```

Leave-One-Out Cross-Validation Results

Method	Value
Root Mean Squared Errors	.01669266
Mean Absolute Errors	.00433538
Pseudo-R2	.05675662

```
184 . scalar loormse6=r(rmse)
```

Spring 2021 Time Series Final Exam – Output

```

186 . *Model 7
187 . reg d.lntotal l(1/3,12,24)d.lntotal i.month if tin(1992m1, )

```

Source	SS	df	MS	Number of obs	=	350
Model	.023953973	16	.001497123	F(16, 333)	=	15.96
Residual	.031232978	333	.000093793	Prob > F	=	0.0000
				R-squared	=	0.4341
				Adj R-squared	=	0.4069
Total	.055186951	349	.000158129	Root MSE	=	.00968

D.lntotal	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lntotal					
LD.	-.0250361	.0542514	-0.46	0.645	-.1317547 .0816825
L2D.	-.1543916	.0536983	-2.88	0.004	-.2600223 -.0487609
L3D.	-.0081015	.0546261	-0.15	0.882	-.1155572 .0993543
L12D.	.4055952	.1437901	2.82	0.005	.1227438 .6884465
L24D.	.0158983	.1433915	0.11	0.912	-.2661689 .2979656

```

*Month indicators and constant dropped for space

```

```

188 . estat ic
    Akaike's information criterion and Bayesian information criterion

```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	350	1035.49	1135.109	17	-2236.218	-2170.633

```

    Note: N=Obs used in calculating BIC; see [R] BIC note.
189 . scalar df7=el(r(S),1,4)
190 . scalar aic7=el(r(S),1,5)

```

```

191 . loocv reg d.lntotal l(1/3,12,24)d.lntotal i.month if tin(1992m1, )
    Leave-One-Out Cross-Validation Results

```

Method	Value
Root Mean Squared Errors	.01300797
Mean Absolute Errors	.00427199
Pseudo-R2	.14852182

```

192 . scalar loormse7=r(rmse)

```

Spring 2021 Time Series Final Exam – Output

```

194 . *Model 8
195 . reg d.lntotal l(1/3)d.lntotal i.month if tin(1992m1, )

```

Source	SS	df	MS	Number of obs	=	351
Model	.023288368	14	.001663455	F(14, 336)	=	17.36
Residual	.032198594	336	.000095829	Prob > F	=	0.0000
				R-squared	=	0.4197
				Adj R-squared	=	0.3955
Total	.055486962	350	.000158534	Root MSE	=	.00979

D.lntotal	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lntotal					
L1D.	-.0081612	.0545415	-0.15	0.881	-.1154469 .0991245
L2D.	-.1384185	.0540209	-2.56	0.011	-.2446802 -.0321568
L3D.	.0181448	.0545173	0.33	0.739	-.0890933 .125383

*Month indicators and constant dropped for space

```

196 . estat ic
    Akaike's information criterion and Bayesian information criterion

```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	351	1037.998	1133.509	15	-2237.018	-2179.107

Note: N=Obs used in calculating BIC; see [R] BIC note.

```

197 . scalar df8=el(r(S),1,4)
198 . scalar aic8=el(r(S),1,5)
199 . loocv reg d.lntotal l(1/3)d.lntotal i.month if tin(1992m1, )

```

Leave-One-Out Cross-Validation Results

Method	Value
Root Mean Squared Errors	.01329027
Mean Absolute Errors	.00451099
Pseudo-R2	.12759005

```

200 . scalar loormse8=r(rmse)

```

Spring 2021 Time Series Final Exam – Output

```
1121
1122 202 . matrix drop _all
1123
1124 203 . matrix fit1=(df1,aic1,loormse1)
1125 204 . matrix fit2=(df2,aic2,loormse2)
1126 205 . matrix fit3=(df3,aic3,loormse3)
1127 206 . matrix fit4=(df4,aic4,loormse4)
1128 207 . matrix fit5=(df5,aic5,loormse5)
1129 208 . matrix fit6=(df6,aic6,loormse6)
1130 209 . matrix fit7=(df7,aic7,loormse7)
1131 210 . matrix fit8=(df8,aic8,loormse8)
1132 212 . matrix FIT=fit1\fit2\fit3\fit4\fit5\fit6\fit7\fit8
1133 213 . matrix rownames FIT="Model 1" "Model 2" "Model 3" "Model 4" ///
1134 >      "Model 5" "Model 6" "Model 7" "Model 8"
1135 214 . matrix colnames FIT=NVARs AIC LOORMSE
1136
1137 215 . matrix list FIT
1138
1139 FIT[8,3]
1140
1141      NVARS      AIC      LOORMSE
1142 Model 1      32 -2256.3704 .01274467
1143 Model 2      24 -2250.5854 .0125165
1144 Model 3      17 -2244.908 .01231975
1145 Model 4      15 -2242.8827 .01211767
1146 Model 5      32 -2228.1241 .01737282
1147 Model 6      24 -2244.1604 .01669266
1148 Model 7      17 -2236.2179 .01300797
1149 Model 8      15 -2237.0183 .01329027
```