```
      name:  <unnamed>
       log:  /Users/angelinaolson/Desktop/Paper.smcl
  log type:  smcl
 opened on:  18 Dec 2019, 14:18:25

 1 . do "/var/folders/rr/lczqrgc55kl7dg2v9_sjksq00000gn/T//SD00430.000000"

 2 . ************************************************************
 3 . /*
   > Name: Ange Olson
   > Date: Nov 27 2019
   > File Purpose: Econ 400 Final Paper
   > Last Edited: Dec 4 2019
   > */
 4 .
 5 . ************************
 6 . *       generate logged variables
 7 . use "/Users/angelinaolson/Desktop/Final_Paper.dta"

 8 . foreach var of varlist car_sales electricity HEV all_gas TRANSIT miles_travel
   > led {
     2. gen l`var' = ln(`var')
     3. }
   (2 missing values generated)
   (4 missing values generated)
   (17 missing values generated)
   (1 missing value generated)
   (5 missing values generated)
   (3 missing values generated)

 9 . gen mtnh = month(dofm(Time))

10 . drop US*

11 . drop electricity

12 . reg HEV i.mtnh

      Source |       SS           df       MS      Number of obs   =       150
-------------+----------------------------------   F(11, 138)      =      3.17
       Model |  2.1153e+09         11  192298313   Prob > F        =    0.0007
    Residual |  8.3582e+09        138  60566959.7   R-squared       =    0.2020
-------------+----------------------------------   Adj R-squared   =    0.1384
       Total |  1.0474e+10        149  70292093.1   Root MSE        =    7782.5

------------------------------------------------------------------------------
         HEV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

mtnh						
2	3561	3052.539	1.17	0.245	-2474.796	9596.796
3	11422.31	3052.539	3.74	0.000	5386.512	17458.1
4	9036	3052.539	2.96	0.004	3000.204	15071.8
5	12996.46	3052.539	4.26	0.000	6960.666	19032.26
6	7776.308	3052.539	2.55	0.012	1740.512	13812.1
7	9924.263	3115.484	3.19	0.002	3764.004	16084.52
8	12135.43	3115.484	3.90	0.000	5975.171	18295.69
9	5571.846	3115.484	1.79	0.076	-588.4123	11732.1
10	4801.679	3115.484	1.54	0.126	-1358.579	10961.94
11	5038.096	3115.484	1.62	0.108	-1122.162	11198.35
12	8979.763	3115.484	2.88	0.005	2819.504	15140.02
_cons	21714.15	2158.471	10.06	0.000	17446.2	25982.11

```
13 . tsset Time
        time variable:  Time, 2006m1 to 2019m11
                delta:  1 month

14 . *shows evidence of seasonality
15 .
16 . ******************************************
17 . *       SUMMARY STATS
18 . ******************************************
19 . sum all_gas in 1/150
```

Variable	Obs	Mean	Std. Dev.	Min	Max
all_gas	150	2.89954	.5750405	1.721	4.051

```
20 . sum miles_travelled in 1/150
```

Variable	Obs	Mean	Std. Dev.	Min	Max
miles_trav~d	150	3028182	81971.09	2945065	3215643

```
21 . sum car_sales in 1/150
```

Variable	Obs	Mean	Std. Dev.	Min	Max
car_sales	150	15.36389	2.516811	9.223	18.44

```
22 . sum  HEV  in 1/150
```

Variable	Obs	Mean	Std. Dev.	Min	Max
HEV	150	29312.22	8384.038	12714	53020

```
23 . sum  TRANSIT  in 1/150
```

Variable	Obs	Mean	Std. Dev.	Min	Max
TRANSIT	**150**	**860738.7**	**46018.04**	**746114**	**993437**

```
24 .
25 .
26 . *******************************************
27 . *       TESTS FOR STATIONARITY
28 . *******************************************
29 .
30 .  gen t = _n

31 .
32 . *****************
33 . *1. HEV
34 . *****************
35 .
36 . *       specify the variable to use for the lag selection
37 . global yvar HEV

38 .
39 . *       set an initial number of lags to try
40 . local maxlags = 24

41 .
42 . *       initialize counter for while loop and break
43 . local i=0

44 . local b=1

45 .
46 . *       begin while loop
47 . while `b'==1{
     2.         *       define the number of lags to try
48 .         local lags = `maxlags' - `i'
     3.         *       run the ADF regression - can add the trend here
49 . qui     reg D.$yvar L.$yvar DL(1/`lags').$yvar if t>`maxlags'+1
     4.         * determine if we should stop the while loop
50 .         if 2*ttail(e(df_r),abs(_b[DL`lags'.$yvar]/_se[DL`lags'.$yvar])) <0.1{
     5.                 di "The optimal number of lags for HEV by the ttest is " `
   > lags'
     6.                 local b=0
     7.                 dfuller $yvar, lags(`lags')
     8.         }
     9.         *       increment counter
51 .         local i = `i'+1
    10. }
```

```
   The optimal number of lags for HEV by the ttest is 17

   Augmented Dickey-Fuller test for unit root         Number of obs   =       132

                                    ———— Interpolated Dickey-Fuller ————
                  Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
——————————————————————————————————————————————————————————————————————————
 Z(t)            -1.883           -3.499            -2.888           -2.578
——————————————————————————————————————————————————————————————————————————
   MacKinnon approximate p-value for Z(t) = 0.3402

52 .
53 . dfuller D.HEV, lags(17)

   Augmented Dickey-Fuller test for unit root         Number of obs   =       131

                                    ———— Interpolated Dickey-Fuller ————
                  Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
——————————————————————————————————————————————————————————————————————————
 Z(t)            -2.959           -3.500            -2.888           -2.578
——————————————————————————————————————————————————————————————————————————
   MacKinnon approximate p-value for Z(t) = 0.0389

54 . *stationairy in first differences
55 .
56 . *****************
57 . *2. all_gas
58 . *****************
59 .
60 . *       specify the variable to use for the lag selection
61 . global yvar all_gas

62 .
63 . *       set an initial number of lags to try
64 . local maxlags = 24

65 .
66 . *       initialize counter for while loop and break
67 . local i=0

68 . local b=1

69 .
70 . *       begin while loop
71 . while `b'==1{
     2.         *       define the number of lags to try
72 .         local lags = `maxlags' - `i'
```

```
     3.         *       run the ADF regression - can add the trend here
73 . qui     reg D.$yvar L.$yvar DL(1/`lags').$yvar if t>`maxlags'+1
     4.         * determine if we should stop the while loop
74 .         if 2*ttail(e(df_r),abs(_b[DL`lags'.$yvar]/_se[DL`lags'.$yvar])) <0.1{
     5.                 di "The optimal number of lags for all_gas by the ttest is
   >  " `lags'
     6.                 local b=0
     7.                 dfuller $yvar, lags(`lags')
     8.         }
     9.         *       increment counter
75 .         local i = `i'+1
    10. }
   The optimal number of lags for all_gas by the ttest is 6

   Augmented Dickey-Fuller test for unit root         Number of obs   =       159

                                    ---------- Interpolated Dickey-Fuller ----------
                      Test         1% Critical       5% Critical      10% Critical
                   Statistic           Value             Value             Value
   ------------------------------------------------------------------------------
    Z(t)             -2.080           -3.490            -2.886            -2.576
   ------------------------------------------------------------------------------
   MacKinnon approximate p-value for Z(t) = 0.2525

76 .
77 . dfuller D.all_gas, lags(6)

   Augmented Dickey-Fuller test for unit root         Number of obs   =       158

                                    ---------- Interpolated Dickey-Fuller ----------
                      Test         1% Critical       5% Critical      10% Critical
                   Statistic           Value             Value             Value
   ------------------------------------------------------------------------------
    Z(t)             -6.602           -3.491            -2.886            -2.576
   ------------------------------------------------------------------------------
   MacKinnon approximate p-value for Z(t) = 0.0000

78 . *stationairy in first differences
79 .
80 . *       lag selection: miles_travelled
81 .
82 . *       specify the variable to use for the lag selection
83 . global yvar miles_travelled

84 .
85 . *       set an initial number of lags to try
86 . local maxlags = 12

87 .
```

```
 88 . *       initialize counter for while loop and break
 89 . local i=0

 90 . local b=1

 91 .
 92 . *       begin while loop
 93 . while `b'==1{
      2.         *       define the number of lags to try
 94 .         local lags = `maxlags' - `i'
      3.         *       run the ADF regression - can add the trend here
 95 . qui     reg D.$yvar L.$yvar DL(1/`lags').$yvar if t>`maxlags'+1
      4.         * determine if we should stop the while loop
 96 .         if 2*ttail(e(df_r),abs(_b[DL`lags'.$yvar]/_se[DL`lags'.$yvar])) <0.1{
      5.                 di "The optimal number of lags for miles_travelled by the
    > ttest is " `lags'
      6.                 local b=0
      7.                 dfuller $yvar, lags(`lags')
      8.         }
      9.         *       increment counter
 97 .         local i = `i'+1
     10. }
    The optimal number of lags for miles_travelled by the ttest is 11

    Augmented Dickey-Fuller test for unit root         Number of obs   =       152

                                   ---------- Interpolated Dickey-Fuller ----------
                      Test         1% Critical       5% Critical      10% Critical
                    Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)             -0.059           -3.493            -2.887           -2.577
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.9534

 98 . dfuller D.miles_travelled, lags(11)

    Augmented Dickey-Fuller test for unit root         Number of obs   =       151

                                   ---------- Interpolated Dickey-Fuller ----------
                      Test         1% Critical       5% Critical      10% Critical
                    Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)             -2.029           -3.493            -2.887           -2.577
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.2738

 99 . *not stationary in first differences
100 . dfuller D.miles_travelled, trend lags(11)
```

```
Augmented Dickey-Fuller test for unit root         Number of obs   =       151

                                 ------------ Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -2.739            -4.023            -3.443           -3.143
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.2202

. *not stationary
. dfuller D2.miles_travelled, lags(11)

Augmented Dickey-Fuller test for unit root         Number of obs   =       150

                                 ------------ Interpolated Dickey-Fuller ---------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -4.663            -3.493            -2.887           -2.577
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0001

. *stationary
.
. *****************
. *3. car_sales
. *****************
.
. *       specify the variable to use for the lag selection
. global yvar car_sales

.
. *       set an initial number of lags to try
. local maxlags = 12

.
. *       initialize counter for while loop and break
. local i=0

. local b=1

.
. *       begin while loop
. while `b'==1{
  2.          *       define the number of lags to try
.         local lags = `maxlags' - `i'
  3.          *       run the ADF regression - can add the trend here
. qui     reg D.$yvar L.$yvar DL(1/`lags').$yvar if t>`maxlags'+1
```

```
      4.         * determine if we should stop the while loop
123 .         if 2*ttail(e(df_r),abs(_b[DL`lags'.$yvar]/_se[DL`lags'.$yvar])) <0.1{
      5.                 di "The optimal number of lags for car_sales by the ttest
    > is " `lags'
      6.                 local b=0
      7.                 dfuller $yvar, lags(`lags')
      8.         }
      9.         *       increment counter
124 .         local i = `i'+1
     10. }
    The optimal number of lags for car_sales by the ttest is 12

    Augmented Dickey-Fuller test for unit root         Number of obs   =       152

                                   ---------- Interpolated Dickey-Fuller ----------
                      Test         1% Critical       5% Critical      10% Critical
                    Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)            -1.570           -3.493            -2.887           -2.577
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.4986

125 . dfuller D.car_sales, lags(12)

    Augmented Dickey-Fuller test for unit root         Number of obs   =       151

                                   ---------- Interpolated Dickey-Fuller ----------
                      Test         1% Critical       5% Critical      10% Critical
                    Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)            -2.616           -3.493            -2.887           -2.577
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.0897

126 . *stationary alpha = .1
127 .
128 . *****************
129 . *4. transit
130 . *****************
131 .
132 . *       specify the variable to use for the lag selection
133 . global yvar TRANSIT

134 .
135 . *       set an initial number of lags to try
136 . local maxlags = 12

137 .
138 . *       initialize counter for while loop and break
```

```
139 . local i=0

140 . local b=1

141 .
142 . *       begin while loop
143 . while `b'==1{
      2.          *       define the number of lags to try
144 .         local lags = `maxlags' - `i'
      3.          *       run the ADF regression - can add the trend here
145 . qui     reg D.$yvar L.$yvar DL(1/`lags').$yvar if t>`maxlags'+1
      4.          * determine if we should stop the while loop
146 .         if 2*ttail(e(df_r),abs(_b[DL`lags'.$yvar]/_se[DL`lags'.$yvar])) <0.1{
      5.                  di "The optimal number of lags for transit by the ttest is
    >  " `lags'
      6.                  local b=0
      7.                  dfuller $yvar, lags(`lags')
      8.          }
      9.          *       increment counter
147 .         local i = `i'+1
     10. }
    The optimal number of lags for transit by the ttest is 12

    Augmented Dickey-Fuller test for unit root         Number of obs   =       149

                                    ---------- Interpolated Dickey-Fuller ----------
                       Test         1% Critical       5% Critical      10% Critical
                     Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)             -0.862           -3.494            -2.887           -2.577
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.8003

148 . dfuller D.TRANSIT, lags(12)

    Augmented Dickey-Fuller test for unit root         Number of obs   =       148

                                    ---------- Interpolated Dickey-Fuller ----------
                       Test         1% Critical       5% Critical      10% Critical
                     Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)             -4.459           -3.494            -2.887           -2.577
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.0002

149 . *stationary
150 .
151 . ****************************************
152 . *       TESTS FOR STRUCTURAL BREAKS
```

```
153 . ****************************************
154 . *1. HEV and time trend
155 .
156 . *       Manual procedure
157 . *       cycle through dates
158 . *       summarize t to determine the values to trim from the sample
159 . sum t
```

Variable	Obs	Mean	Std. Dev.	Min	Max
t	**167**	**84**	**48.35287**	**1**	**167**

```
160 . *       set the trim level
161 . local trim = 0.15

162 . *       define the starting and end points for the search for a break
163 . local min = floor(`trim'*r(max))

164 . local max = floor((1-`trim')*r(max))

165 . local T = `max'-`min'

166 .
167 . *       start with a bigM as the minimum
168 . scalar teststat = -100000000

169 . scalar lrstat = .

170 . scalar time = .

171 .
172 . *       create a matrix to store the results
173 . matrix results = J(`T',4,.)

174 . matrix colnames results = Time "Test Stat" "p-value" "ll"

175 .
176 . *       initialize the break variables
177 . gen d=0

178 . gen dt=0

179 .
180 .
181 . qui{

182 . gen tBreak = results[_n,1]
    (51 missing values generated)
```

```
183 . gen tStat = results[_n,2]
    (51 missing values generated)

184 . gen tLR = results[_n,4]
    (51 missing values generated)

185 .
186 . *       display results from individual test
187 . qui{

188 . list t in `result'

     +----+
     |  t |
     |----|
 93. | 93 |
     +----+

189 .
190 . *break at 2013m9
191 .
192 . **********************
193 . *       see if stationary before/after this date
194 . *       lag selection: HEV pre 2013m9
195 . **********************
196 .
197 . *       specify the variable to use for the lag selection
198 . gen HEV_pre = HEV if t < 93
    (75 missing values generated)

199 . global yvar HEV_pre

200 .
201 . *       set an initial number of lags to try
202 . local maxlags = 12

203 .
204 . *       initialize counter for while loop and break
205 . local i=0

206 . local b=1

207 .
208 . *       begin while loop
209 . while `b'==1{
  2.          *       define the number of lags to try
210 .         local lags = `maxlags' - `i'
  3.          *       run the ADF regression - can add the trend here
211 . qui     reg D.$yvar L.$yvar DL(1/`lags').$yvar if t>`maxlags'+1
```

```
      4.         * determine if we should stop the while loop
212 .         if 2*ttail(e(df_r),abs(_b[DL`lags'.$yvar]/_se[DL`lags'.$yvar])) <0.1{
      5.                 di "The optimal number of lags for HEV by the ttest is " `
    > lags'
      6.                 local b=0
      7.                 dfuller $yvar, lags(`lags')
      8.         }
      9.         *       increment counter
213 .         local i = `i'+1
     10. }
    The optimal number of lags for HEV by the ttest is 12

    Augmented Dickey-Fuller test for unit root         Number of obs   =        79

                                   ---------- Interpolated Dickey-Fuller ---------
                      Test         1% Critical       5% Critical      10% Critical
                    Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)            -0.425           -3.539            -2.907           -2.588
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.9058

214 .
215 . dfuller D.HEV if t < 93, lags(12)

    Augmented Dickey-Fuller test for unit root         Number of obs   =        78

                                   ---------- Interpolated Dickey-Fuller ---------
                      Test         1% Critical       5% Critical      10% Critical
                    Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)            -2.916           -3.541            -2.908           -2.589
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.0435

216 . *not stationairy in first differences at alpha = .01
217 .
218 . *       lag selection: HEV post 2013m9
219 .
220 . *       specify the variable to use for the lag selection
221 . gen HEV_pos = HEV if t > 93
    (110 missing values generated)

222 . global yvar HEV_pos

223 .
224 . *       set an initial number of lags to try
225 . local maxlags = 12
```

```
226 .
227 . *       initialize counter for while loop and break
228 . local i=0

229 . local b=1

230 .
231 . *       begin while loop
232 . while `b'==1{
      2.         *       define the number of lags to try
233 .         local lags = `maxlags' - `i'
      3.         *       run the ADF regression - can add the trend here
234 . qui     reg D.$yvar L.$yvar DL(1/`lags').$yvar if t>`maxlags'+1
      4.         * determine if we should stop the while loop
235 .         if 2*ttail(e(df_r),abs(_b[DL`lags'.$yvar]/_se[DL`lags'.$yvar])) <0.1{
      5.                 di "The optimal number of lags for HEV by the ttest is " `
    > lags'
      6.                 local b=0
      7.                 dfuller $yvar, lags(`lags')
      8.         }
      9.         *       increment counter
236 .         local i = `i'+1
     10. }
    The optimal number of lags for HEV by the ttest is 11

    Augmented Dickey-Fuller test for unit root         Number of obs   =        45

                                   ---------- Interpolated Dickey-Fuller ----------
                      Test         1% Critical       5% Critical      10% Critical
                    Statistic           Value             Value            Value
    ------------------------------------------------------------------------------
     Z(t)            -2.972           -3.614            -2.944           -2.606
    ------------------------------------------------------------------------------
    MacKinnon approximate p-value for Z(t) = 0.0376

237 . *stationairy in levels
238 .
239 .
240 . *1. Gas and time trend
241 . *       Manual procedure
242 . *       cycle through dates
243 . *       summarize t to determine the values to trim from the sample
244 . sum t

    Variable |        Obs        Mean    Std. Dev.       Min        Max
    ---------+---------------------------------------------------------
           t |        167          84    48.35287         1        167

245 . *       set the trim level
```

```
246 . local trim = 0.15

247 . *       define the starting and end points for the search for a break
248 . local min = floor(`trim'*r(max))

249 . local max = floor((1-`trim')*r(max))

250 . local T = `max'-`min'

251 .
252 . *       start with a bigM as the minimum
253 . scalar teststat = -100000000

254 . scalar lrstat = .

255 . scalar time = .

256 .
257 . *       create a matrix to store the results
258 . matrix results = J(`T',4,.)

259 . matrix colnames results = Time "Test Stat" "p-value" "ll"

260 .
261 . qui{

262 . gen gBreak = results[_n,1]
    (51 missing values generated)

263 . gen gStat = results[_n,2]
    (51 missing values generated)

264 . gen gLR = results[_n,4]
    (51 missing values generated)

265 .
266 . *       display results from individual test
267 . qui{

268 . list t in `result'

     +----+
     |  t |
     |----|
37.  | 37 |
     +----+

269 .
270 . *break at 2009m1
```

```
271 .
272 . ****************************************
273 . *       COINTEGRATION
274 . ****************************************
275 . egranger lHEV lall_gas

    Engle-Granger test for cointegration                N (1st step)  =      150
                                                        N (test)      =      149
    ------------------------------------------------------------------------------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value             Value
    ------------------------------------------------------------------------------
     Z(t)            -5.411           -3.971            -3.377            -3.073
    ------------------------------------------------------------------------------

    Critical values from MacKinnon (1990, 2010)

276 . egranger lHEV lTRANSIT
    Replacing variable _egresid...

    Engle-Granger test for cointegration                N (1st step)  =      150
                                                        N (test)      =      149
    ------------------------------------------------------------------------------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value             Value
    ------------------------------------------------------------------------------
     Z(t)            -5.580           -3.971            -3.377            -3.073
    ------------------------------------------------------------------------------

    Critical values from MacKinnon (1990, 2010)

277 . egranger lHEV lmiles_travelled
    Replacing variable _egresid...

    Engle-Granger test for cointegration                N (1st step)  =      150
                                                        N (test)      =      149
    ------------------------------------------------------------------------------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value             Value
    ------------------------------------------------------------------------------
     Z(t)            -5.212           -3.971            -3.377            -3.073
    ------------------------------------------------------------------------------

    Critical values from MacKinnon (1990, 2010)

278 . egranger lHEV lcar_sales
    Replacing variable _egresid...

    Engle-Granger test for cointegration                N (1st step)  =      150
                                                        N (test)      =      149
    ------------------------------------------------------------------------------
                    Test         1% Critical       5% Critical      10% Critical
```

	Statistic	Value	Value	Value
Z(t)	**-5.764**	**-3.971**	**-3.377**	**-3.073**

Critical values from MacKinnon (1990, 2010)

```
279 . egranger lHEV lall_gas lcar_sales lTRANSIT lmiles_travelled
```
Replacing variable _egresid...

Engle-Granger test for cointegration — N (1st step) = **150**; N (test) = **149**

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-6.444**	**-5.106**	**-4.510**	**-4.204**

Critical values from MacKinnon (1990, 2010)

```
280 . egranger lHEV lall_gas lTRANSIT lmiles_travelled
```
Replacing variable _egresid...

Engle-Granger test for cointegration — N (1st step) = **150**; N (test) = **149**

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-6.130**	**-4.767**	**-4.172**	**-3.867**

Critical values from MacKinnon (1990, 2010)

```
281 .
282 . *other direction
283 . egranger lall_gas lcar_sales
```
Replacing variable _egresid...

Engle-Granger test for cointegration — N (1st step) = **165**; N (test) = **164**

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	**-2.285**	**-3.964**	**-3.374**	**-3.070**

Critical values from MacKinnon (1990, 2010)

```
284 . egranger lall_gas lHEV
```
Replacing variable _egresid...

```
Engle-Granger test for cointegration                N (1st step)  =      150
                                                    N (test)      =      149
------------------------------------------------------------------------------
                Test         1% Critical       5% Critical      10% Critical
              Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)           -2.573           -3.971            -3.377            -3.073
------------------------------------------------------------------------------
Critical values from MacKinnon (1990, 2010)

285 . egranger lcar_sales lHEV
Replacing variable _egresid...

Engle-Granger test for cointegration                N (1st step)  =      150
                                                    N (test)      =      149
------------------------------------------------------------------------------
                Test         1% Critical       5% Critical      10% Critical
              Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)           -2.951           -3.971            -3.377            -3.073
------------------------------------------------------------------------------
Critical values from MacKinnon (1990, 2010)

286 . egranger lcar_sales lall_gas
Replacing variable _egresid...

Engle-Granger test for cointegration                N (1st step)  =      165
                                                    N (test)      =      164
------------------------------------------------------------------------------
                Test         1% Critical       5% Critical      10% Critical
              Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)           -2.011           -3.964            -3.374            -3.070
------------------------------------------------------------------------------
Critical values from MacKinnon (1990, 2010)

287 .
288 . ****************************************
289 . *       REGRESSION ANALYSIS
290 . ****************************************
291 . tab mtnh, gen(month)

       mtnh |      Freq.     Percent        Cum.
------------+-----------------------------------
          1 |         14        8.38        8.38
          2 |         14        8.38       16.77
          3 |         14        8.38       25.15
          4 |         14        8.38       33.53
```

5	**14**	**8.38**	**41.92**
6	**14**	**8.38**	**50.30**
7	**14**	**8.38**	**58.68**
8	**14**	**8.38**	**67.07**
9	**14**	**8.38**	**75.45**
10	**14**	**8.38**	**83.83**
11	**14**	**8.38**	**92.22**
12	**13**	**7.78**	**100.00**
Total	**167**	**100.00**	

```
292 . varsoc D.lHEV D.lall_gas D.lcar_sales D.lmiles_travelled D.lTRANSIT, exog(mon
> th2-month12)
```

Selection-order criteria
Sample: **2006m6 - 2018m6** Number of obs = **145**

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	**1571.99**				**6.0e-16**	**-20.855**	**-20.3545**	**-19.6233**
1	**1703.77**	**263.57**	**25**	**0.000**	**1.4e-16**	**-22.3279**	**-21.6189**	**-20.5829**
2	**1767.51**	**127.47**	**25**	**0.000**	**8.2e-17***	**-22.8622***	**-21.9446***	**-20.604***
3	**1787.92**	**40.818***	**25**	**0.024**	**8.8e-17**	**-22.7989**	**-21.6727**	**-20.0274**
4	**1804.36**	**32.882**	**25**	**0.134**	**1.0e-16**	**-22.6808**	**-21.3461**	**-19.3961**

Endogenous: D.lHEV D.lall_gas D.lcar_sales D.lmiles_travelled D.lTRANSIT
Exogenous: month2 month3 month4 month5 month6 month7 month8 month9 month10 month11 month12 _cons

```
293 .
294 . *******
295 . *OLS
296 . *******
297 . reg D.lHEV D.lall_gas i.mtnh D.lcar_sales D.lmiles_travelled D.lTRANSIT DL(1/
> 2).lall_gas DL(1/2).lcar_sales DL(1/2).lTRANSIT DL.lHEV DL(1/2).lmiles_travel
> led
```

Source	SS	df	MS		
Model	**4.89006364**	**24**	**.203752652**	Number of obs	= **147**
Residual	**2.06351458**	**122**	**.016914054**	F(24, 122)	= **12.05**
				Prob > F	= **0.0000**
Total	**6.95357821**	**146**	**.047627248**	R-squared	= **0.7032**
				Adj R-squared	= **0.6449**
				Root MSE	= **.13005**

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

```
> ———
        lall_gas |
             D1. |   .544763   .2280651     2.39   0.018     .0932854    .9962
> 407
                 |
            mtnh |
              2  |   .4328703   .0839185     5.16   0.000     .2667453    .5989
> 953
              3  |   .3891702   .1077631     3.61   0.000     .1758424    .6024
> 979
              4  |   .1532307   .1181009     1.30   0.197    -.0805619    .3870
> 233
              5  |   .3144591   .1261418     2.49   0.014     .0647488    .5641
> 694
              6  |   .1761677   .0747836     2.36   0.020      .028126    .3242
> 093
              7  |   .4050132   .0830871     4.87   0.000      .240534    .5694
> 925
              8  |   .3060484   .0680978     4.49   0.000      .171242    .4408
> 549
              9  |   .0386496   .0930073     0.42   0.678    -.1454677    .2227
> 669
             10  |   .1597136    .122941     1.30   0.196    -.0836605    .4030
> 876
             11  |   .3553616   .1023033     3.47   0.001     .1528419    .5578
> 813
             12  |   .5404828   .0794608     6.80   0.000     .3831823    .6977
> 833
                 |
      lcar_sales |
             D1. |   .9783209   .2401741     4.07   0.000     .5028724     1.45
> 377
                 |
lmiles_travelled |
             D1. |  -10.9502   13.73912    -0.80   0.427    -38.14816    16.24
> 776
                 |
        lTRANSIT |
             D1. |   1.369426   .5611888     2.44   0.016     .2584964    2.480
> 355
                 |
        lall_gas |
             LD. |  -.194919   .2392997    -0.81   0.417    -.6686366    .2787
> 987
            L2D. |  -.1444325   .2166793    -0.67   0.506    -.5733709    .2845
> 059
                 |
      lcar_sales |
             LD. |   .1174709   .2727584     0.43   0.667    -.4224816    .6574
```

```
> 235
             L2D. |   .4283998   .2325306     1.84   0.068    -.0319178    .8887
> 173
                  |
          lTRANSIT |
               LD. |   .9036571   .6308364     1.43   0.155    -.3451466    2.152
> 461
             L2D. |   .2767618   .4978102     0.56   0.579    -.7087032    1.262
> 227
                  |
             lHEV |
               LD. |   -.071497   .0926246    -0.77   0.442    -.2548565    .1118
> 626
                  |
lmiles_travelled  |
               LD. |   22.36712   14.26453     1.57   0.119    -5.870943    50.60
> 518
             L2D. |   -19.2189   13.80967    -1.39   0.167    -46.55651    8.118
> 716
                  |
            _cons |   -.264335   .0742159    -3.56   0.001    -.4112528   -.1174
> 172
------------------+------------------------------------------------------------
> ———
```

```
298 . *display the short run elasticity and confidence bands
299 . lincom D.lall_gas

 ( 1)  D.lall_gas = 0

------------------------------------------------------------------------------
      D.lHEV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |    .544763   .2280651     2.39   0.018     .0932854    .9962407
------------------------------------------------------------------------------

300 . *display the long run elasticity and confidence bands
301 . nlcom _b[D.lall_gas]/(1-_b[DL.lHEV])

       _nl_1:  _b[D.lall_gas]/(1-_b[DL.lHEV])

------------------------------------------------------------------------------
      D.lHEV |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _nl_1 |   .5084131   .2204117     2.31   0.021     .0764141     .940412
------------------------------------------------------------------------------

302 . estat ic
```

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	**147**	**15.67749**	**104.9686**	**25**	**-159.9373**	**-85.17648**

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

```
303 . estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of D.lHEV

         chi2(1)      =     0.76
         Prob > chi2  =   0.3837

304 . predict e, resid
(20 missing values generated)

305 . hist e
(bin=12, start=-.41729894, width=.05998197)

306 .
307 . reg lHEV D.lall_gas i.mtnh D.lcar_sales D.lmiles_travelled D.lTRANSIT DL(1/2)
> .lall_gas DL(1/2).lcar_sales DL(1/2).lTRANSIT L.lHEV DL(1/2).lmiles_travelled
>  if t > 93
```

Source	SS	df	MS		
Model	**1.67365259**	**24**	**.069735525**	Number of obs	= **57**
Residual	**.138394529**	**32**	**.004324829**	F(24, 32)	= **16.12**
				Prob > F	= **0.0000**
Total	**1.81204712**	**56**	**.032357984**	R-squared	= **0.9236**
				Adj R-squared	= **0.8663**
				Root MSE	= **.06576**

lHEV	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
lall_gas D1.	**-.0060624**	**.2441899**	**-0.02**	**0.980**	**-.503461** **.4913361**
mtnh 2	**.5544615**	**.085276**	**6.50**	**0.000**	**.38076** **.7281629**

```
                3 |   .5437568    .137095     3.97   0.000     .2645034    .8230
> 103
                4 |   .3761914   .1384225     2.72   0.011     .0942339    .6581
> 489
                5 |   .5634961   .1437805     3.92   0.000     .2706248    .8563
> 675
                6 |   .3160015   .0748941     4.22   0.000     .1634472    .4685
> 557
                7 |   .4825887   .0763495     6.32   0.000     .3270698    .6381
> 076
                8 |   .4888974   .0777099     6.29   0.000     .3306075    .6471
> 873
                9 |   .3569527   .1111279     3.21   0.003     .1305927    .5833
> 128
               10 |   .3301254   .1432013     2.31   0.028     .0384338    .6218
> 169
               11 |   .4795615   .1013996     4.73   0.000     .2730172    .6861
> 058
               12 |   .5821796   .0719967     8.09   0.000     .4355271    .7288
> 321
                  |
      lcar_sales
              D1. |   1.606486   .4999134     3.21   0.003     .5881954    2.624
> 776
                  |
lmiles_travelled
              D1. |  -12.13417   19.85406    -0.61   0.545    -52.57557    28.30
> 722
                  |
        lTRANSIT
              D1. |   .3649535   .6301024     0.58   0.567    -.9185232     1.64
> 843
                  |
        lall_gas
              LD. |   .2773765   .2394094     1.16   0.255    -.2102846    .7650
> 375
             L2D. |  -.0453617   .2164407    -0.21   0.835    -.4862369    .3955
> 136
                  |
      lcar_sales
              LD. |  -.1204791   .5455461    -0.22   0.827     -1.23172    .9907
> 619
             L2D. |   1.367607   .5250548     2.60   0.014     .2981053    2.437
> 109
                  |
        lTRANSIT
              LD. |  -.4508693   .6962205    -0.65   0.522    -1.869024    .9672
> 855
             L2D. |  -.3176704   .5466605    -0.58   0.565    -1.431181    .7958
```

```
> 406
                    |
             lHEV   |
              L1.   |   .7627035   .0854961     8.92   0.000     .5885535    .9368
> 534
                    |
lmiles_travelled    |
              LD.   |   69.69275   17.69731     3.94   0.000     33.64451     105.
> 741
              L2D.  |  -73.53217   21.12125    -3.48   0.001    -116.5547    -30.5
> 096
                    |
             _cons  |   2.052391   .9202416     2.23   0.033     .1779201    3.926
> 862
                    |
------------------------------------------------------------------------------
> ———
```

```
308 . *display the short run elasticity and confidence bands
309 . lincom D.lall_gas

 ( 1)  D.lall_gas = 0
```

lHEV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
(1)	-.0060624	.2441899	-0.02	0.980	-.503461	.4913361

```
310 . *display the long run elasticity and confidence bands
311 . nlcom _b[D.lall_gas]/(1-_b[L.lHEV])

       _nl_1:  _b[D.lall_gas]/(1-_b[L.lHEV])
```

lHEV	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	-.0255479	1.02793	-0.02	0.980	-2.040254	1.989158

```
312 . estat ic

Akaike's information criterion and Bayesian information criterion
```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	57	17.40543	90.7104	25	-131.4208	-80.34451

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

```
313 . estat hettest

    Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
             Ho: Constant variance
             Variables: fitted values of lHEV

             chi2(1)      =     0.09
             Prob > chi2  =   0.7681

314 . predict e2, resid
    (20 missing values generated)

315 . hist e2
    (bin=12, start=-.50086969, width=.07720375)

316 .
317 .
318 . reg D.lHEV D.lall_gas i.mtnh D.lcar_sales D.lmiles_travelled D.lTRANSIT DL(1/
    > 2).lall_gas DL(1/2).lcar_sales DL(1/2).lTRANSIT DL.lHEV DL(1/2).lmiles_travel
    > led if t < 93

      Source |       SS           df       MS      Number of obs   =        89
-------------+----------------------------------   F(24, 64)       =      6.32
       Model |  3.36026077        24  .140010866   Prob > F        =    0.0000
    Residual |  1.41870221        64  .022167222   R-squared       =    0.7031
-------------+----------------------------------   Adj R-squared   =    0.5918
       Total |  4.77896298        88  .054306398   Root MSE        =    .14889

------------------------------------------------------------------------------
> ----
      D.lHEV |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interv
> al]
-------------+----------------------------------------------------------------
> ----
   lall_gas |
         D1. |   .7097468   .3447253     2.06   0.044     .0210789    1.398
> 415
             |
        mtnh |
          2  |   .4901521   .1302104     3.76   0.000     .2300268    .7502
> 774
          3  |   .3471227   .1544426     2.25   0.028     .0385882    .6556
> 572
          4  |   .1289068   .1646256     0.78   0.436    -.1999706    .4577
> 841
          5  |   .2510851   .1836806     1.37   0.176    -.1158591    .6180
> 293
          6  |   .2162332   .1145191     1.89   0.064     -.012545    .4450
```

7	.4443143	.122306	3.63	0.001	.1999801	.6886
8	.2678407	.0944811	2.83	0.006	.0790929	.4565
9	.033058	.1329023	0.25	0.804	-.2324449	.2985
10	.2032188	.171587	1.18	0.241	-.1395656	.5460
11	.388857	.1501703	2.59	0.012	.0888574	.6888
12	.5894038	.122118	4.83	0.000	.345445	.8333
lcar_sales						
D1.	.973615	.3163778	3.08	0.003	.3415776	1.605
lmiles_travelled						
D1.	-15.05956	19.63572	-0.77	0.446	-54.28642	24.1
lTRANSIT						
D1.	2.135536	.8450556	2.53	0.014	.4473431	3.823
lall_gas						
LD.	-.4150805	.375037	-1.11	0.273	-1.164303	.334
L2D.	-.1886669	.328039	-0.58	0.567	-.8440002	.4666
lcar_sales						
LD.	.0580558	.3608068	0.16	0.873	-.6627386	.7788
L2D.	.3954183	.2984881	1.32	0.190	-.2008802	.9917
lTRANSIT						
LD.	1.277308	.9092227	1.40	0.165	-.5390728	3.09
L2D.	.4860631	.7589757	0.64	0.524	-1.030165	2.002
lHEV						
LD.	.0453395	.1342218	0.34	0.737	-.2227993	.3134
lmiles_travelled						

```
             LD. |   17.73176   21.47024     0.83   0.412    -25.15996    60.62
> 349
             L2D. |  -12.32447   19.41095    -0.63   0.528     -51.1023    26.45
> 336
                  |
           _cons |  -.2697365   .1056517    -2.55   0.013       -.4808    -.058
> 673
-------------------+----------------------------------------------------------
> ——
```

```
319 . *display the short run elasticity and confidence bands
320 . lincom D.lall_gas

 ( 1)  D.lall_gas = 0
```

D.lHEV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
(1)	.7097468	.3447253	2.06	0.044	.0210789	1.398415

```
321 . *display the long run elasticity and confidence bands
322 . nlcom _b[D.lall_gas]/(1-_b[DL.lHEV])

       _nl_1:  _b[D.lall_gas]/(1-_b[DL.lHEV])
```

D.lHEV	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	.7434547	.3951046	1.88	0.060	-.0309361	1.517845

```
323 . estat ic

Akaike's information criterion and Bayesian information criterion
```

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	89	3.85084	57.89525	25	-65.79049	-3.574585

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

```
324 . estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of D.lHEV
```

```
            chi2(1)      =     1.41
            Prob > chi2  =   0.2357

325 . predict e3, resid
    (20 missing values generated)

326 . hist e3
    (bin=12, start=-.33610964, width=.05335296)

327 .
328 . *post 2013m9, relationship between HEV and gas price also seems to change (be
    > comes insig)
329 .
330 . sum all_gas if t > 93

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     all_gas |         73    2.647836    .4510384      1.788      3.699

331 . sum D.all_gas if t > 93

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     all_gas |
         D1. |         73   -.0133562    .1414161      -.439       .277

332 . sum all_gas if t < 93

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     all_gas |         92    3.043935    .5696412      1.721      4.051

333 . sum D.all_gas if t < 93

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     all_gas |
         D1. |         91    .0136264    .2051741      -.912       .356

334 .
335 . *gas prices/change in prices are also different before/after this date
336 . *       chow test for difference across inflation rates
337 . reg D.lHEV D.lall_gas i.mtnh DL(1/2).lall_gas DL.lHEV

      Source |       SS           df       MS      Number of obs   =       147
-------------+----------------------------------   F(15, 131)      =     13.54
       Model |  4.22664793        15  .281776529   Prob > F        =    0.0000
    Residual |  2.72693028       131  .020816262   R-squared       =    0.6078
-------------+----------------------------------   Adj R-squared   =    0.5629
```

Total	6.95357821	146	.047627248	Root MSE	=	.14428

D.lHEV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lall_gas						
D1.	.8338221	.2267113	3.68	0.000	.3853332	1.282311
mtnh						
2	.3992441	.0731593	5.46	0.000	.2545176	.5439705
3	.5628954	.0607685	9.26	0.000	.4426809	.6831099
4	.254588	.0613599	4.15	0.000	.1332035	.3759724
5	.3697181	.0656673	5.63	0.000	.2398126	.4996236
6	.157302	.0615386	2.56	0.012	.0355639	.2790401
7	.3824597	.0676151	5.66	0.000	.2487008	.5162186
8	.375189	.0599439	6.26	0.000	.2566057	.4937724
9	.1165204	.0601659	1.94	0.055	-.0025022	.235543
10	.2944072	.067953	4.33	0.000	.1599799	.4288345
11	.3206406	.0610003	5.26	0.000	.1999675	.4413136
12	.4744246	.0607977	7.80	0.000	.3541521	.594697
lall_gas						
LD.	-.2382227	.2556658	-0.93	0.353	-.7439907	.2675453
L2D.	.1194959	.2273774	0.53	0.600	-.3303108	.5693026
lHEV						
LD.	-.1462329	.0864306	-1.69	0.093	-.3172134	.0247475
_cons	-.3040693	.0450088	-6.76	0.000	-.3931074	-.2150312

```
338 . scalar rssp = e(rss)

339 .
340 . reg D.lHEV D.lall_gas i.mtnh DL(1/2).lall_gas DL.lHEV if t > 93
```

Source	SS	df	MS	Number of obs	=	57
				F(15, 41)	=	11.92
Model	1.5901153	15	.106007687	Prob > F	=	0.0000
Residual	.364476187	41	.008889663	R-squared	=	0.8135
				Adj R-squared	=	0.7453
Total	1.95459149	56	.034903419	Root MSE	=	.09429

D.lHEV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lall_gas						
D1.	.1983262	.2787126	0.71	0.481	-.3645454	.7611978

mtnh						
2	.2738743	.0862117	3.18	0.003	.0997662	.4479823
3	.5492166	.0635191	8.65	0.000	.4209372	.6774961
4	.3077877	.0660789	4.66	0.000	.1743387	.4412367
5	.4164087	.0724345	5.75	0.000	.2701243	.5626931
6	.2060843	.0657494	3.13	0.003	.0733007	.3388679
7	.2916642	.0780665	3.74	0.001	.1340056	.4493228
8	.4089561	.0653119	6.26	0.000	.277056	.5408561
9	.1933566	.0643479	3.00	0.005	.0634033	.3233098
10	.1122455	.0736068	1.52	0.135	-.0364065	.2608976
11	.2543091	.0663877	3.83	0.000	.1202365	.3883817
12	.4227661	.0615937	6.86	0.000	.2983751	.5471571
lall_gas						
LD.	.1290146	.2877295	0.45	0.656	-.4520669	.7100961
L2D.	.1791473	.2778677	0.64	0.523	-.382018	.7403126
lHEV						
LD.	-.4587146	.128583	-3.57	0.001	-.7183933	-.199036
_cons	-.2891523	.0475032	-6.09	0.000	-.3850869	-.1932177

```
341 . scalar rss1 = e(rss)

342 . scalar n1 = e(N)

343 .
344 . reg D.lHEV D.lall_gas i.mtnh DL(1/2).lall_gas DL.lHEV if t < 93
```

Source	SS	df	MS		
Model	2.80920364	15	.187280243	Number of obs	= 89
Residual	1.96975934	73	.026983005	F(15, 73)	= 6.94
				Prob > F	= 0.0000
Total	4.77896298	88	.054306398	R-squared	= 0.5878
				Adj R-squared	= 0.5031
				Root MSE	= .16427

D.lHEV	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lall_gas						
D1.	1.128755	.3177937	3.55	0.001	.4953931	1.762117
mtnh						
2	.4459594	.1078975	4.13	0.000	.2309201	.6609987
3	.6110191	.0907804	6.73	0.000	.430094	.7919441
4	.24537	.0900723	2.72	0.008	.0658562	.4248839
5	.3447101	.0959615	3.59	0.001	.1534591	.5359612
6	.1663491	.0917943	1.81	0.074	-.0165967	.3492948

7	.4121515	.0969403	4.25	0.000	.2189497	.6053532
8	.3695781	.0868527	4.26	0.000	.1964808	.5426753
9	.1366734	.0919746	1.49	0.142	-.0466317	.3199786
10	.3991198	.1017463	3.92	0.000	.1963398	.6018998
11	.3398603	.0904407	3.76	0.000	.1596123	.5201083
12	.5127495	.0920076	5.57	0.000	.3293786	.6961205
lall_gas						
LD.	-.5304559	.3777026	-1.40	0.164	-1.283216	.2223042
L2D.	.1780661	.3205199	0.56	0.580	-.4607292	.8168614
lHEV						
LD.	-.0521206	.1161971	-0.45	0.655	-.2837011	.1794598
_cons	-.3207378	.0677368	-4.74	0.000	-.4557371	-.1857385

```
345 . scalar rss2 = e(rss)

346 . scalar n2 = e(N)

347 .
348 . scalar k = 2

349 .
350 . di ((rssp-(rss1+rss2))/k)/((rss1+rss2)/(n1+n2-2*(k)))
    11.944522

351 .
352 . *yes, evidence for a difference
353 .
354 . *******
355 . *VAR
356 . *******
357 .
358 . *VAR 1
359 . var D.lHEV D.lall_gas D.lcar_sales D.lmiles_travelled D.lTRANSIT, exog(month2
    > -month12) lags(2)

    Vector autoregression

    Sample:  2006m4 - 2018m6                        Number of obs     =        147
    Log likelihood =   1670.113                     AIC               =  -21.56616
    FPE            =   2.98e-16                     HQIC              =  -20.86359
    Det(Sigma_ml)  =   9.32e-17                     SBIC              =    -19.837

    Equation           Parms      RMSE     R-sq      chi2     P>chi2
    ------------------------------------------------------------------
    D_lHEV                17     .146567   0.5984   219.0237   0.0000
```

D_lall_gas	17	.060693	0.2692	54.13928	0.0000
D_lcar_sales	17	.056227	0.0985	16.06793	0.4482
D_lmiles_trave~d	17	.001049	0.4617	126.0784	0.0000
D_lTRANSIT	17	.03257	0.7379	413.8849	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
D_lHEV					
lHEV L2D.	-.1946481	.0887134	-2.19	0.028	-.3685232 -.0
> 20773					
lall_gas L2D.	.0756297	.2041423	0.37	0.711	-.3244818 .47
> 57413					
lcar_sales L2D.	.5704122	.2336272	2.44	0.015	.1125113 1.0
> 28313					
lmiles_travelled L2D.	-8.186309	8.938442	-0.92	0.360	-25.70533 9.3
> 32715					
lTRANSIT L2D.	-.5471526	.3752193	-1.46	0.145	-1.282569 .18
> 82638					
month2	.5406843	.0615216	8.79	0.000	.4201043 .66
> 12644					
month3	.5911995	.0742266	7.96	0.000	.4457179 .7
> 36681					
month4	.3231179	.0618586	5.22	0.000	.2018774 .44
> 43585					
month5	.5834164	.0970443	6.01	0.000	.3932131 .77
> 36198					
month6	.1858645	.0631984	2.94	0.003	.0619979 .30
> 97311					
month7	.490255	.0714064	6.87	0.000	.350301 .63
> 02089					
month8	.379366	.0632259	6.00	0.000	.2554454 .50
> 32865					
month9	.1702688	.0631739	2.70	0.007	.0464503 .29
> 40873					

```
            month10 |   .3688796   .0714667     5.16   0.000     .2288074    .50
> 89518
            month11 |   .3615255   .0748746     4.83   0.000      .214774     .5
> 08277
            month12 |   .5507001   .0770766     7.14   0.000     .3996328    .70
> 17675
              _cons |  -.3700968   .0541882    -6.83   0.000    -.4763039   -.26
> 38898
------------------------------------------------------------------------------
> ------
D_lall_gas
                lHEV |
              L2D. |  -.0015786    .036736    -0.04   0.966    -.0735799     .07
> 04226
                     |
           lall_gas |
              L2D. |  -.0023839   .0845348    -0.03   0.978     -.168069     .16
> 33013
                     |
         lcar_sales |
              L2D. |   .0313118   .0967444     0.32   0.746    -.1583038     .22
> 09273
                     |
  lmiles_travelled |
              L2D. |   8.442969   3.701385     2.28   0.023     1.188387    15.
> 69755
                     |
           lTRANSIT |
              L2D. |  -.0178895   .1553773    -0.12   0.908    -.3224235     .28
> 66445
                     |
             month2 |   .0178394   .0254759     0.70   0.484    -.0320925     .06
> 77713
             month3 |   .0605789   .0307371     1.97   0.049     .0003354     .12
> 08224
             month4 |   .0518726   .0256155     2.03   0.043     .0016673      .1
> 02078
             month5 |   .0446726   .0401858     1.11   0.266    -.0340901     .12
> 34353
             month6 |   .0090187   .0261703     0.34   0.730    -.0422741     .06
> 03115
             month7 |  -.0125324   .0295692    -0.42   0.672     -.070487     .04
> 54222
             month8 |  -.0042855   .0261817    -0.16   0.870    -.0556007     .04
> 70297
             month9 |  -.0114072   .0261601    -0.44   0.663    -.0626801     .03
> 98657
            month10 |   -.044241   .0295942    -1.49   0.135    -.1022445     .01
> 37625
```

```
            month11 |  -.0378557   .0310054    -1.22   0.222    -.0986251    .02
> 29137
            month12 |  -.0357435   .0319172    -1.12   0.263    -.0983001    .02
> 68132
              _cons |  -.0067172   .0224392    -0.30   0.765    -.0506973    .03
> 72628
--------------------+-----------------------------------------------------------
> ------
D_lcar_sales        |
                lHEV |
              L2D.  |  -.0207763    .034033    -0.61   0.542    -.0874796    .04
> 59271
                    |
           lall_gas |
              L2D.  |   .2033045   .0783147     2.60   0.009     .0498105    .35
> 67986
                    |
         lcar_sales |
              L2D.  |  -.0887666    .089626    -0.99   0.322    -.2644302    .08
> 68971
                    |
   lmiles_travelled |
              L2D.  |   2.745797   3.429037     0.80   0.423    -3.974993    9.4
> 66587
                    |
           lTRANSIT |
              L2D.  |  -.1718434   .1439447    -1.19   0.233    -.4539698     .1
> 10283
                    |
             month2 |    .01687   .0236014     0.71   0.475    -.0293879    .06
> 31279
             month3 |   .0189462   .0284754     0.67   0.506    -.0368646     .0
> 74757
             month4 |    .006139   .0237307     0.26   0.796    -.0403723    .05
> 26502
             month5 |    .034474   .0372289     0.93   0.354    -.0384933    .10
> 74414
             month6 |  -.0093824   .0242447    -0.39   0.699    -.0569011    .03
> 81363
             month7 |   .0256727   .0273935     0.94   0.349    -.0280176     .0
> 79363
             month8 |   .0231409   .0242552     0.95   0.340    -.0243985    .07
> 06803
             month9 |  -.0107371   .0242353    -0.44   0.658    -.0582374    .03
> 67632
            month10 |    .016755   .0274166     0.61   0.541    -.0369807    .07
> 04906
            month11 |   .0167954    .028724     0.58   0.559    -.0395026    .07
> 30934
```

```
            month12 |   .0309762   .0295688     1.05   0.295    -.0269774    .08
> 89299
              _cons |  -.0151858   .0207881    -0.73   0.465    -.0559297    .02
> 55582
--------------------+------------------------------------------------------------
> ------
D_lmiles_travelled  |
                lHEV |
              L2D.  |   .0016196    .000635     2.55   0.011     .0003749    .00
> 28642
                    |
           lall_gas |
              L2D.  |  -.0009527   .0014613    -0.65   0.514    -.0038169    .00
> 19114
                    |
         lcar_sales |
              L2D.  |  -.0035885   .0016724    -2.15   0.032    -.0068663   -.00
> 03107
                    |
   lmiles_travelled |
              L2D.  |   .6892423   .0639841    10.77   0.000     .5638358    .81
> 46489
                    |
           lTRANSIT |
              L2D.  |  -.0126508   .0026859    -4.71   0.000    -.0179151   -.00
> 73864
                    |
             month2 |   .0002579   .0004404     0.59   0.558    -.0006052    .00
> 11211
             month3 |   .0018285   .0005313     3.44   0.001     .0007871    .00
> 28699
             month4 |   .0011155   .0004428     2.52   0.012     .0002476    .00
> 19834
             month5 |   .0025939   .0006947     3.73   0.000     .0012324    .00
> 39554
             month6 |   .0010314   .0004524     2.28   0.023     .0001447    .00
> 19181
             month7 |   .0016199   .0005111     3.17   0.002      .000618    .00
> 26217
             month8 |    .001134   .0004526     2.51   0.012      .000247    .00
> 20211
             month9 |   .0011017   .0004522     2.44   0.015     .0002153     .0
> 01988
            month10 |   .0019002   .0005116     3.71   0.000     .0008975    .00
> 29029
            month11 |   .0017541    .000536     3.27   0.001     .0007036    .00
> 28046
            month12 |   .0018856   .0005517     3.42   0.001     .0008042     .0
> 02967
```

```
             _cons |  -.0012152   .0003879    -3.13   0.002    -.0019755    -.0
> 00455
-------------------+---------------------------------------------------------
> -----
D_lTRANSIT         |
             lHEV  |
            L2D.   |   .0834092   .0197136     4.23   0.000     .0447712    .12
> 20472
           lall_gas|
            L2D.   |  -.0445245   .0453639    -0.98   0.326    -.1334361    .04
> 43871
         lcar_sales|
            L2D.   |  -.1196805   .0519159    -2.31   0.021    -.2214339   -.01
> 79272
   lmiles_travelled|
            L2D.   |   .8695731   1.986273     0.44   0.662    -3.023451    4.7
> 62597
           lTRANSIT|
            L2D.   |  -.1354515   .0833801    -1.62   0.104    -.2988735    .02
> 79705
            month2 |  -.0260175   .0136711    -1.90   0.057    -.0528124    .00
> 07775
            month3 |   .1583759   .0164944     9.60   0.000     .1260474    .19
> 07043
            month4 |  -.0263897    .013746    -1.92   0.055    -.0533314     .0
> 00552
            month5 |   .0354781   .0215649     1.65   0.100    -.0067883    .07
> 77445
            month6 |  -.0198427   .0140438    -1.41   0.158     -.047368    .00
> 76826
            month7 |  -.0028767   .0158677    -0.18   0.856    -.0339768    .02
> 82235
            month8 |   .0473975   .0140499     3.37   0.001     .0198603    .07
> 49348
            month9 |   .0346323   .0140383     2.47   0.014     .0071177    .06
> 21469
           month10 |   .0664386   .0158811     4.18   0.000     .0353122    .09
> 75651
           month11 |  -.0604538   .0166384    -3.63   0.000    -.0930645   -.02
> 78431
           month12 |  -.0091027   .0171277    -0.53   0.595    -.0426724    .02
> 44671
             _cons |   -.017063   .0120415    -1.42   0.156     -.040664     .0
> 06538
```

```
------------------+-----------------------------------------------------------
> ------

360 .
361 . *       cumulative irfs
362 . irf create order1, set(varirfs) step(30) order(D.lHEV D.lall_gas D.lcar_sales
    >  D.lmiles_travelled D.lTRANSIT) replace
    (file varirfs.irf now active)
    (file varirfs.irf updated)

363 . irf table cirf, irf(order1) impulse(D.lall_gas) response(D.lHEV D.lall_gas D.
    > lcar_sales D.lmiles_travelled D.lTRANSIT) noci
```

Results from order1

step	(1) cirf	(2) cirf	(3) cirf	(4) cirf	(5) cirf
0	**0**	**1**	**0**	**0**	**0**
1	**0**	**1**	**0**	**0**	**0**
2	**.07563**	**.997616**	**.203305**	**-.000953**	**-.044525**
3	**.07563**	**.997616**	**.203305**	**-.000953**	**-.044525**
4	**.208857**	**.996621**	**.188237**	**-.001651**	**-.057239**
5	**.208857**	**.996621**	**.188237**	**-.001651**	**-.057239**
6	**.186927**	**.990274**	**.186872**	**-.001701**	**-.043164**
7	**.186927**	**.990274**	**.186872**	**-.001701**	**-.043164**
8	**.182642**	**.98961**	**.183604**	**-.001937**	**-.046497**
9	**.182642**	**.98961**	**.183604**	**-.001937**	**-.046497**
10	**.185323**	**.987577**	**.183771**	**-.002053**	**-.046188**
11	**.185323**	**.987577**	**.183771**	**-.002053**	**-.046188**
12	**.18552**	**.986601**	**.182916**	**-.002131**	**-.046036**
13	**.18552**	**.986601**	**.182916**	**-.002131**	**-.046036**
14	**.185476**	**.985915**	**.182549**	**-.002182**	**-.045963**
15	**.185476**	**.985915**	**.182549**	**-.002182**	**-.045963**
16	**.185603**	**.985471**	**.18229**	**-.002217**	**-.045947**
17	**.185603**	**.985471**	**.18229**	**-.002217**	**-.045947**
18	**.185669**	**.985173**	**.182123**	**-.002239**	**-.045917**
19	**.185669**	**.985173**	**.182123**	**-.002239**	**-.045917**
20	**.185706**	**.984979**	**.182009**	**-.002254**	**-.045902**
21	**.185706**	**.984979**	**.182009**	**-.002254**	**-.045902**
22	**.185732**	**.984851**	**.181936**	**-.002263**	**-.045891**
23	**.185732**	**.984851**	**.181936**	**-.002263**	**-.045891**
24	**.185749**	**.984766**	**.181887**	**-.00227**	**-.045885**
25	**.185749**	**.984766**	**.181887**	**-.00227**	**-.045885**
26	**.18576**	**.984711**	**.181855**	**-.002274**	**-.04588**
27	**.18576**	**.984711**	**.181855**	**-.002274**	**-.04588**
28	**.185768**	**.984674**	**.181834**	**-.002277**	**-.045877**
29	**.185768**	**.984674**	**.181834**	**-.002277**	**-.045877**

30	.185773	.98465	.18182	-.002279	-.045875

(1) irfname = order1, impulse = D.lall_gas, and response = D.lHEV
(2) irfname = order1, impulse = D.lall_gas, and response = D.lall_gas
(3) irfname = order1, impulse = D.lall_gas, and response = D.lcar_sales
(4) irfname = order1, impulse = D.lall_gas, and response = D.lmiles_travelled
(5) irfname = order1, impulse = D.lall_gas, and response = D.lTRANSIT

```
364 . irf graph cirf, irf(order1) impulse(D.lall_gas) response(D.lHEV D.lcar_sales
    > D.lmiles_travelled D.lTRANSIT) level(67)

365 .
366 . *VAR 2
367 . var D.lHEV D.lall_gas D.lcar_sales D.lmiles_travelled D.lTRANSIT if t < 93, e
    > xog(month2-month12) lags(2)

    Vector autoregression

    Sample:  2006m4 - 2013m8                        Number of obs     =         89
    Log likelihood =   984.2478                     AIC               =  -20.20781
    FPE            =   1.18e-15                     HQIC              =   -19.2498
    Det(Sigma_ml)  =   1.71e-16                     SBIC              =  -17.83103

    Equation           Parms      RMSE     R-sq      chi2     P>chi2
    ------------------------------------------------------------------
    D_lHEV                17     .17216   0.5535   110.3084   0.0000
    D_lall_gas            17     .066249  0.3289   43.61563   0.0002
    D_lcar_sales          17     .070073  0.1726   18.56999   0.2916
    D_lmiles_trave~d      17     .001174  0.3264   43.11958   0.0003
    D_lTRANSIT            17     .033848  0.7302   240.8725   0.0000
    ------------------------------------------------------------------

    ------------------------------------------------------------------------------
    > ------
                         |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
    > rval]
    -------------------------------------------------------------------------------
    > ------
    D_lHEV               |
                   lHEV  |
                   L2D.  |  -.2551341   .1195805    -2.13   0.033    -.4895076   -.02
    > 07605
                         |
                lall_gas |
                   L2D.  |   .0729457   .2762752     0.26   0.792    -.4685436    .61
    > 44351
                         |
               lcar_sales |
```

```
                L2D. |   .5401365   .2901282     1.86   0.063    -.0285043    1.1
> 08777
                     |
  lmiles_travelled
                L2D. |  -.5084145   14.41239    -0.04   0.972    -28.75618    27.
> 73935
                     |
          lTRANSIT
                L2D. |  -.3890652   .6006755    -0.65   0.517    -1.566368    .78
> 82372
                     |
             month2  |   .5168246   .0886627     5.83   0.000     .3430489    .69
> 06004
             month3  |   .5951498   .1125739     5.29   0.000      .374509    .81
> 57905
             month4  |    .29057    .087475     3.32   0.001     .1191222    .46
> 20178
             month5  |   .5012935   .1438532     3.48   0.000     .2193464    .78
> 32406
             month6  |    .133025   .0901944     1.47   0.140    -.0437528    .30
> 98027
             month7  |   .4443248   .1048037     4.24   0.000     .2389133    .64
> 97362
             month8  |   .3209278   .0876019     3.66   0.000     .1492312    .49
> 26244
             month9  |   .1273398    .092864     1.37   0.170    -.0546702    .30
> 93498
            month10  |   .3628573   .1076317     3.37   0.001     .1519031    .57
> 38115
            month11  |   .3087922   .1081122     2.86   0.004     .0968962    .52
> 06883
            month12  |   .5253961   .1113483     4.72   0.000     .3071574    .74
> 36347
              _cons  |  -.3277562   .0771794    -4.25   0.000    -.4790251   -.17
> 64874
-------------------------------------------------------------------------------
> -----
D_lall_gas
                     |
               lHEV
                L2D. |  -.0019645   .0460156    -0.04   0.966    -.0921534    .08
> 82244
                     |
           lall_gas
                L2D. |  -.0437639    .106313    -0.41   0.681    -.2521336    .16
> 46058
                     |
         lcar_sales
                L2D. |   .0030976   .1116438     0.03   0.978    -.2157203    .22
> 19154
```

```
                 lmiles_travelled |
                            L2D. |   17.62737   5.546009     3.18   0.001     6.757394    28.
> 49735
                                 |
                       lTRANSIT |
                            L2D. |  -.088624    .231145    -0.38   0.701      -.54166     .36
> 44119
                                 |
                          month2 |   .0229553   .0341182     0.67   0.501    -.0439151     .08
> 98257
                          month3 |   .0531358   .0433194     1.23   0.220    -.0317687     .13
> 80402
                          month4 |   .0383452   .0336611     1.14   0.255    -.0276293     .10
> 43198
                          month5 |   .0410841   .0553559     0.74   0.458    -.0674115     .14
> 95798
                          month6 |  -.0111522   .0347076    -0.32   0.748    -.0791778     .05
> 68734
                          month7 |  -.0178116   .0403294    -0.44   0.659    -.0968557     .06
> 12324
                          month8 |   -.015849     .03371    -0.47   0.638    -.0819193     .05
> 02213
                          month9 |  -.0303464   .0357348    -0.85   0.396    -.1003854     .03
> 96926
                         month10 |  -.0639441   .0414176    -1.54   0.123    -.1451211     .01
> 72328
                         month11 |  -.0513411   .0416025    -1.23   0.217    -.1328805     .03
> 01983
                         month12 |  -.0492013   .0428478    -1.15   0.251    -.1331814     .03
> 47788
                           _cons |   .0127056   .0296993     0.43   0.669     -.045504     .07
> 09151
-------------------------------------------------------------------------------------------------
> ------
D_lcar_sales
                            lHEV |
                            L2D. |  -.0294533   .0486718    -0.61   0.545    -.1248482     .06
> 59417
                                 |
                        lall_gas |
                            L2D. |   .3228598   .1124498     2.87   0.004     .1024622     .54
> 32574
                                 |
                       lcar_sales |
                            L2D. |  -.0868951   .1180883    -0.74   0.462     -.318344     .14
> 45537
                                 |
                 lmiles_travelled |
```

```
                L2D. |   1.558142   5.866146     0.27   0.791    -9.939294    13.
> 05558
                     |
           lTRANSIT
                L2D. |  -.2090061   .2444876    -0.85   0.393     -.688193    .27
> 01808
                     |
              month2 |   .0133781   .0360876     0.37   0.711    -.0573523    .08
> 41085
              month3 |   .0112561   .0458199     0.25   0.806    -.0785494    .10
> 10615
              month4 |  -.0091807   .0356042    -0.26   0.797    -.0789636    .06
> 06022
              month5 |   .0277928   .0585513     0.47   0.635    -.0869656    .14
> 25513
              month6 |  -.0272623    .036711    -0.74   0.458    -.0992146      .
> 04469
              month7 |    .021888   .0426573     0.51   0.608    -.0617188    .10
> 54948
              month8 |   .0285494   .0356558     0.80   0.423    -.0413348    .09
> 84335
              month9 |    -.04057   .0377976    -1.07   0.283     -.114652    .03
> 35119
             month10 |   .0167732   .0438084     0.38   0.702    -.0690896     .1
> 02636
             month11 |   .0141875    .044004     0.32   0.747    -.0720587    .10
> 04336
             month12 |   .0440144   .0453211     0.97   0.331    -.0448133    .13
> 28422
               _cons |  -.0101983   .0314136    -0.32   0.745    -.0717679    .05
> 13713
---------------------+-------------------------------------------------------------
> ------
D_lmiles_travelled   |
               lHEV
                L2D. |   .0018869   .0008152     2.31   0.021     .0002892    .00
> 34847
                     |
           lall_gas
                L2D. |  -.0005668   .0018834    -0.30   0.763    -.0042582    .00
> 31246
                     |
         lcar_sales
                L2D. |  -.0044186   .0019778    -2.23   0.025     -.008295   -.00
> 05421
                     |
   lmiles_travelled
                L2D. |   .5870201   .0982509     5.97   0.000     .3944519    .77
> 95883
```

```
                lTRANSIT |
                   L2D. |  -.0173904   .0040949    -4.25   0.000    -.0254162   -.00
> 93646
                         |
                  month2 |   .0005784   .0006044     0.96   0.339    -.0006062    .00
> 17631
                  month3 |   .0022413   .0007674     2.92   0.003     .0007371    .00
> 37454
                  month4 |   .0008787   .0005963     1.47   0.141    -.0002901    .00
> 20474
                  month5 |   .0031493   .0009807     3.21   0.001     .0012272    .00
> 50714
                  month6 |   .0009396   .0006149     1.53   0.126    -.0002655    .00
> 21447
                  month7 |   .0018221   .0007145     2.55   0.011     .0004218    .00
> 32224
                  month8 |   .0012254   .0005972     2.05   0.040     .0000549    .00
> 23958
                  month9 |   .0011843   .0006331     1.87   0.061    -.0000565    .00
> 24251
                 month10 |   .0022471   .0007337     3.06   0.002      .000809    .00
> 36852
                 month11 |    .002087    .000737     2.83   0.005     .0006425    .00
> 35315
                 month12 |   .0018339   .0007591     2.42   0.016     .0003461    .00
> 33216
                   _cons |  -.0015641   .0005261    -2.97   0.003    -.0025953   -.00
> 05328
-----------------------------+------------------------------------------------------
> ------
D_lTRANSIT
                    lHEV |
                   L2D. |   .0608267   .0235105     2.59   0.010     .0147469    .10
> 69064
                         |
                lall_gas |
                   L2D. |  -.0470756   .0543179    -0.87   0.386    -.1535368    .05
> 93855
                         |
              lcar_sales |
                   L2D. |  -.0810538   .0570415    -1.42   0.155    -.1928531    .03
> 07456
                         |
        lmiles_travelled |
                   L2D. |   2.982416   2.833591     1.05   0.293     -2.57132    8.5
> 36152
                         |
                lTRANSIT |
```

```
                L2D. |  -.2079393   .1180976    -1.76   0.078    -.4394064     .02
> 35277
                     |
             month2  |  -.0407285   .0174318    -2.34   0.019    -.0748942   -.00
> 65628
             month3  |   .1443307   .0221329     6.52   0.000     .1009509    .18
> 77104
             month4  |  -.0387612   .0171983    -2.25   0.024    -.0724693   -.00
> 50532
             month5  |   .0439528   .0282827     1.55   0.120    -.0114803    .09
> 93858
             month6  |    -.04036   .0177329    -2.28   0.023    -.0751159   -.00
> 56041
             month7  |  -.0008937   .0206052    -0.04   0.965    -.0412792    .03
> 94919
             month8  |   .0321125   .0172232     1.86   0.062    -.0016445    .06
> 58694
             month9  |   .0234036   .0182578     1.28   0.200     -.012381    .05
> 91883
            month10  |    .058748   .0211612     2.78   0.005     .0172727    .10
> 02233
            month11  |  -.0637208   .0212557    -3.00   0.003    -.1053812   -.02
> 20603
            month12  |  -.0258701    .021892    -1.18   0.237    -.0687776    .01
> 70373
              _cons  |  -.0071247   .0151741    -0.47   0.639    -.0368653     .0
> 22616
-------------------- |------------------------------------------------------------
> ------
```

```
368 .
369 . *       cumulative irfs
370 . irf create order2, set(varirfs) step(30) order(D.lHEV D.lall_gas D.lcar_sales
    >  D.lmiles_travelled D.lTRANSIT) replace
    (file varirfs.irf now active)
    (file varirfs.irf updated)

371 . irf table cirf, irf(order2) impulse(D.lall_gas) response(D.lHEV D.lall_gas D.
    > lcar_sales D.lmiles_travelled D.lTRANSIT) noci
```

Results from order2

step	(1) cirf	(2) cirf	(3) cirf	(4) cirf	(5) cirf
0	**0**	**1**	**0**	**0**	**0**
1	**0**	**1**	**0**	**0**	**0**
2	**.072946**	**.956236**	**.32286**	**-.000567**	**-.047076**

3	.072946	.956236	.32286	-.000567	-.047076
4	.244134	.953188	.287483	-.001345	-.058649
5	.244134	.953188	.287483	-.001345	-.058649
6	.186026	.940184	.285737	-.00112	-.04514
7	.186026	.940184	.285737	-.00112	-.04514
8	.193589	.943639	.280929	-.001317	-.050057
9	.193589	.943639	.280929	-.001317	-.050057
10	.191328	.94042	.282961	-.001313	-.048935
11	.191328	.94042	.282961	-.001313	-.048935
12	.192329	.940531	.281582	-.001342	-.049309
13	.192329	.940531	.281582	-.001342	-.049309
14	.191498	.940043	.281741	-.001345	-.04915
15	.191498	.940043	.281741	-.001345	-.04915
16	.1917	.940007	.281557	-.001351	-.049232
17	.1917	.940007	.281557	-.001351	-.049232
18	.191581	.939904	.281563	-.001352	-.049205
19	.191581	.939904	.281563	-.001352	-.049205
20	.191597	.939888	.281525	-.001353	-.049216
21	.191597	.939888	.281525	-.001353	-.049216
22	.191576	.939867	.281523	-.001354	-.049213
23	.191576	.939867	.281523	-.001354	-.049213
24	.191578	.939861	.281516	-.001354	-.049215
25	.191578	.939861	.281516	-.001354	-.049215
26	.191574	.939857	.281515	-.001354	-.049214
27	.191574	.939857	.281515	-.001354	-.049214
28	.191574	.939855	.281513	-.001354	-.049214
29	.191574	.939855	.281513	-.001354	-.049214
30	.191573	.939854	.281513	-.001354	-.049214

(1) irfname = order2, impulse = D.lall_gas, and response = D.lHEV
(2) irfname = order2, impulse = D.lall_gas, and response = D.lall_gas
(3) irfname = order2, impulse = D.lall_gas, and response = D.lcar_sales
(4) irfname = order2, impulse = D.lall_gas, and response = D.lmiles_travelled
(5) irfname = order2, impulse = D.lall_gas, and response = D.lTRANSIT

```
372 . irf graph cirf, irf(order2) impulse(D.lall_gas) response(D.lHEV D.lcar_sales
    > D.lmiles_travelled D.lTRANSIT) level(67)

373 .
374 . *VAR 3
375 . var D.lHEV D.lall_gas D.lcar_sales D.lmiles_travelled D.lTRANSIT if t > 93, e
    > xog(month2-month12) lags(2)

    Vector autoregression

    Sample:  2013m10 - 2018m6                       Number of obs     =         57
    Log likelihood =   799.9567                     AIC               =   -25.0862
    FPE            =   9.63e-18                     HQIC              =  -23.90217
```

Det(Sigma_ml) = **4.44e-19** SBIC = **-22.03954**

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_lHEV	17	.090736	0.8315	281.3065	0.0000
D_lall_gas	17	.053914	0.3612	32.2282	0.0093
D_lcar_sales	17	.024368	0.1626	11.06542	0.8054
D_lmiles_trave~d	17	.000685	0.6034	86.71793	0.0000
D_lTRANSIT	17	.027455	0.8630	359.1307	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
D_lHEV					
lHEV L2D.	.0147035	.1094017	0.13	0.893	-.1997199 .22
lall_gas L2D.	-.0966617	.2292272	-0.42	0.673	-.5459387 .35
lcar_sales L2D.	.9199107	.5255849	1.75	0.080	-.1102168 1.9
lmiles_travelled L2D.	-30.59013	13.62221	-2.25	0.025	-57.28917 -3.8
lTRANSIT L2D.	-1.010609	.3435614	-2.94	0.003	-1.683977 -.33
month2	.6157123	.0568707	10.83	0.000	.5042479 .72
month3	.6538505	.0697574	9.37	0.000	.5171285 .79
month4	.3749286	.0595991	6.29	0.000	.2581165 .49
month5	.7604989	.0932354	8.16	0.000	.577761 .94
month6	.3135483	.059714	5.25	0.000	.196511 .43
month7	.5712232	.0677034	8.44	0.000	.438527 .70

```
> 39195
             month8 |   .5446329   .0642064     8.48   0.000     .4187907     .67
> 04751
             month9 |   .3273845   .0589165     5.56   0.000     .2119104     .44
> 28587
            month10 |   .4042862   .0645019     6.27   0.000     .2778648     .53
> 07076
            month11 |    .514898   .0745706     6.90   0.000     .3687424     .66
> 10536
            month12 |   .6687066   .0737304     9.07   0.000     .5241976     .81
> 32155
              _cons |  -.4415322   .0544063    -8.12   0.000    -.5481665    -.33
> 48979
------------------------------------------------------------------------------
> ------
D_lall_gas
                lHEV |
              L2D. |  -.0227846   .0650044    -0.35   0.726    -.1501908     .10
> 46216
                     |
           lall_gas |
              L2D. |   .0626559   .1362024     0.46   0.646    -.2042959     .32
> 96077
                     |
         lcar_sales |
              L2D. |   .3620856   .3122924     1.16   0.246    -.2499964     .97
> 41675
                     |
    lmiles_travelled |
              L2D. |   10.19105   8.094054     1.26   0.208    -5.673002    26.
> 05511
                     |
           lTRANSIT |
              L2D. |  -.1397659   .2041376    -0.68   0.494    -.5398683     .26
> 03364
                     |
             month2 |   .0335906   .0337914     0.99   0.320    -.0326394     .09
> 98206
             month3 |    .089931   .0414485     2.17   0.030     .0086934     .17
> 11686
             month4 |   .0915057   .0354126     2.58   0.010     .0220982     .16
> 09132
             month5 |   .0979209   .0553987     1.77   0.077    -.0106585     .20
> 65003
             month6 |   .0491496   .0354809     1.39   0.166    -.0203917      .1
> 18691
             month7 |   .0113034   .0402281     0.28   0.779    -.0675421      .0
> 90149
             month8 |   .0140354   .0381502     0.37   0.713    -.0607376     .08
```

```
> 88085
            month9 |   .0366945    .035007     1.05   0.295    -.0319181     .1
> 05307
           month10 |   .0156252   .0383258     0.41   0.683    -.0594919    .09
> 07424
           month11 |  -.0023066   .0443084    -0.05   0.958    -.0891495    .08
> 45362
           month12 |   .0125578   .0438092     0.29   0.774    -.0733067    .09
> 84222
             _cons |  -.0567062   .0323272    -1.75   0.079    -.1200663    .00
> 66539
--------------------+-------------------------------------------------------------
> -----
D_lcar_sales        |
              lHEV  |
             L2D.   |  -.036193   .0293806    -1.23   0.218     -.093778    .02
> 13919
            lall_gas|
             L2D.   |  -.0658144   .0615607    -1.07   0.285    -.1864711    .05
> 48423
          lcar_sales|
             L2D.   |  -.073009   .1411497    -0.52   0.605    -.3496573    .20
> 36393
    lmiles_travelled|
             L2D.   | -1.173641   3.658344    -0.32   0.748    -8.343864    5.9
> 96581
           lTRANSIT  |
             L2D.   |  -.0903519    .092266    -0.98   0.327    -.2711898    .09
> 04861
            month2  |   .0227581    .015273     1.49   0.136    -.0071765    .05
> 26927
            month3  |   .0091164   .0187339     0.49   0.627    -.0276013    .04
> 58341
            month4  |   .0221482   .0160058     1.38   0.166    -.0092225    .05
> 35189
            month5  |   .0491307    .025039     1.96   0.050     .0000551    .09
> 82063
            month6  |   .0178076   .0160366     1.11   0.267    -.0136236    .04
> 92389
            month7  |   .0355517   .0181823     1.96   0.051    -.0000848    .07
> 11883
            month8  |   .0070308   .0172431     0.41   0.683    -.0267651    .04
> 08266
            month9  |   .0316103   .0158225     2.00   0.046     .0005989    .06
```

```
> 26217
           month10 |    .014106   .0173225     0.81   0.415    -.0198454    .04
> 80574
           month11 |   .0179453   .0200265     0.90   0.370    -.0213059    .05
> 71964
           month12 |    .009952   .0198008     0.50   0.615     -.028857    .04
> 87609
             _cons |  -.0165912   .0146112    -1.14   0.256    -.0452286    .01
> 20463
---------------------+------------------------------------------------------------
> ------
D_lmiles_travelled |
              lHEV |
             L2D. |   .0023815   .0008261     2.88   0.004     .0007623    .00
> 40006
           lall_gas |
             L2D. |  -.0006121   .0017309    -0.35   0.724    -.0040047    .00
> 27805
         lcar_sales |
             L2D. |  -.0016908   .0039688    -0.43   0.670    -.0094694    .00
> 60879
   lmiles_travelled |
             L2D. |   .6910738   .1028633     6.72   0.000     .4894654    .89
> 26823
           lTRANSIT |
             L2D. |  -.0041528   .0025943    -1.60   0.109    -.0092375    .00
> 09319
           month2 |  -.0007769   .0004294    -1.81   0.070    -.0016186    .00
> 00648
           month3 |   .0014948   .0005267     2.84   0.005     .0004624    .00
> 25272
           month4 |   .0008573     .00045     1.90   0.057    -.0000248    .00
> 17394
           month5 |   .0009588    .000704     1.36   0.173    -.0004211    .00
> 23387
           month6 |   .0008352   .0004509     1.85   0.064    -.0000485     .0
> 01719
           month7 |   .0010315   .0005112     2.02   0.044     .0000295    .00
> 20335
           month8 |   .0007044   .0004848     1.45   0.146    -.0002458    .00
> 16547
           month9 |   .0004654   .0004449     1.05   0.295    -.0004065    .00
> 13374
          month10 |   .0010162   .0004871     2.09   0.037     .0000616    .00
```

```
> 19708
           month11 |   .0009265   .0005631     1.65   0.100    -.0001772    .00
> 20301
           month12 |    .001522   .0005567     2.73   0.006     .0004308    .00
> 26132
             _cons |  -.0003418   .0004108    -0.83   0.405    -.001147     .00
> 04634
-------------------+------------------------------------------------------------
> ------
D_lTRANSIT         |
              lHEV |
             L2D.  |   .2191033   .0331025     6.62   0.000     .1542236    .28
> 39829
           lall_gas |
             L2D.  |  -.005805    .0693589    -0.08   0.933    -.141746     .1
> 30136
         lcar_sales |
             L2D.  |  -.621242     .15903     -3.91   0.000    -.9329351   -.30
> 95488
   lmiles_travelled |
             L2D.  |  -3.601742    4.12177    -0.87   0.382    -11.68026    4.4
> 76779
           lTRANSIT |
             L2D.  |  -.2096916   .1039539    -2.02   0.044    -.4134375   -.00
> 59458
            month2 |  -.0064433   .0172078    -0.37   0.708    -.0401699    .02
> 72833
            month3 |   .2285151    .021107    10.83   0.000     .1871461     .2
> 69884
            month4 |  -.0122708   .0180333    -0.68   0.496    -.0476155    .02
> 30739
            month5 |   .0414943   .0282109     1.47   0.141    -.0137981    .09
> 67866
            month6 |   .0251715   .0180681     1.39   0.164    -.0102413    .06
> 05844
            month7 |  -.0083415   .0204855    -0.41   0.684    -.0484924    .03
> 18094
            month8 |   .0979233   .0194274     5.04   0.000     .0598463    .13
> 60003
            month9 |   .0618197   .0178268     3.47   0.001     .0268799    .09
> 67596
           month10 |   .0786323   .0195168     4.03   0.000     .0403801    .11
> 68845
           month11 |  -.0058217   .0225634    -0.26   0.796    -.050045     .03
```

```
> 84017
            month12 |   .0499004   .0223091     2.24   0.025     .0061752    .09
> 36255
              _cons |  -.0390912   .0164621    -2.37   0.018    -.0713563   -.00
> 68261
--------------------+-------------------------------------------------------------
> ------

376 .
377 . *       cumulative irfs
378 . irf create order3, set(varirfs) step(30) order(D.lHEV D.lall_gas D.lcar_sales
>  D.lmiles_travelled D.lTRANSIT) replace
(file varirfs.irf now active)
(file varirfs.irf updated)

379 . irf table cirf, irf(order3) impulse(D.lall_gas) response(D.lHEV D.lall_gas D.
> lcar_sales D.lmiles_travelled D.lTRANSIT) noci
```

Results from order3

step	(1) cirf	(2) cirf	(3) cirf	(4) cirf	(5) cirf
0	0	1	0	0	0
1	0	1	0	0	0
2	-.096662	1.06266	-.065814	-.000612	-.005805
3	-.096662	1.06266	-.065814	-.000612	-.005805
4	-.140092	1.03953	-.060392	-.001168	.016961
5	-.140092	1.03953	-.060392	-.001168	.016961
6	-.139501	1.03218	-.059098	-.001746	.00144
7	-.139501	1.03218	-.059098	-.001746	.00144
8	-.104245	1.02846	-.05665	-.002076	.006142
9	-.104245	1.02846	-.05665	-.002076	.006142
10	-.095749	1.02428	-.057897	-.002242	.012573
11	-.095749	1.02428	-.057897	-.002242	.012573
12	-.097787	1.02079	-.058224	-.002359	.014483
13	-.097787	1.02079	-.058224	-.002359	.014483
14	-.096145	1.01904	-.057932	-.00245	.01428
15	-.096145	1.01904	-.057932	-.00245	.01428
16	-.092705	1.0181	-.057773	-.002507	.014837
17	-.092705	1.0181	-.057773	-.002507	.014837
18	-.091228	1.01736	-.057831	-.00254	.015587
19	-.091228	1.01736	-.057831	-.00254	.015587
20	-.090923	1.01681	-.05786	-.002563	.015914
21	-.090923	1.01681	-.05786	-.002563	.015914
22	-.090545	1.01649	-.057836	-.002578	.016013
23	-.090545	1.01649	-.057836	-.002578	.016013
24	-.090112	1.0163	-.057821	-.002588	.016119

25	-.090112	1.0163	-.057821	-.002588	.016119
26	-.08987	1.01617	-.057823	-.002594	.01622
27	-.08987	1.01617	-.057823	-.002594	.01622
28	-.089765	1.01607	-.057825	-.002599	.016276
29	-.089765	1.01607	-.057825	-.002599	.016276
30	-.089687	1.01601	-.057822	-.002601	.016303

(1) irfname = order3, impulse = D.lall_gas, and response = D.lHEV
(2) irfname = order3, impulse = D.lall_gas, and response = D.lall_gas
(3) irfname = order3, impulse = D.lall_gas, and response = D.lcar_sales
(4) irfname = order3, impulse = D.lall_gas, and response = D.lmiles_travelled
(5) irfname = order3, impulse = D.lall_gas, and response = D.lTRANSIT

```
380 . irf graph cirf, irf(order3) impulse(D.lall_gas) response(D.lHEV D.lcar_sales
    > D.lmiles_travelled D.lTRANSIT) level(67)

381 .
382 . *******
383 . *VECM
384 . *******
385 .
386 . vecrank lHEV lall_gas lTRANSIT lmiles_travelled lcar_sales, sindicators(month
    > 2-month12)
```

Johansen tests for cointegration

Trend: constant — Number of obs = **148**
Sample: **2006m3 - 2018m6** — Lags = **2**

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	**85**	**1737.5549**	**.**	**107.0075**	**68.52**
1	**94**	**1764.6828**	**0.30691**	**52.7518**	**47.21**
2	**101**	**1777.4152**	**0.15807**	**27.2869***	**29.68**
3	**106**	**1786.2714**	**0.11279**	**9.5746**	**15.41**
4	**109**	**1791.0583**	**0.06264**	**0.0009**	**3.76**
5	**110**	**1791.0587**	**0.00001**		

```
387 . *likely two cointegrating vectors
388 .
389 . vec lHEV lall_gas lmiles_travelled lcar_sales lTRANSIT, rank(2) lags(2) sindi
    > cators(month2-month12)
```

Vector error-correction model

Sample: **2006m3 - 2018m6** — Number of obs = **148**
AIC = **-22.65426**

```
Log likelihood =  1777.415                     HQIC             =  -21.82322
Det(Sigma_ml)  =  2.55e-17                     SBIC             =  -20.60887

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_lHEV                19     .145025   0.6117   201.6361   0.0000
D_lall_gas            19     .055807   0.3913   82.27452   0.0000
D_lmiles_trave~d      19      .00095   0.6108   200.9109   0.0000
D_lcar_sales          19     .051525   0.2489   42.42217   0.0016
D_lTRANSIT            19     .024535   0.8576   770.6155   0.0000
------------------------------------------------------------------

------------------------------------------------------------------------------
> ------
                    |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
> rval]
------------------------------------------------------------------------------
> ------
D_lHEV              |
              _ce1  |
               L1.  |  -.1081409   .0509616    -2.12   0.034    -.2080239    -.0
> 08258
              _ce2  |
               L1.  |   .1931897   .0804679     2.40   0.016     .0354756     .35
> 09038
            lHEV    |
               LD.  |  -.0642049   .0966771    -0.66   0.507    -.2536886     .12
> 52787
          lall_gas  |
               LD.  |   .0890525   .2200278     0.40   0.686    -.3421942     .52
> 02991
  lmiles_travelled  |
               LD.  |   32.00703   13.21334     2.42   0.015     6.109352      57
> .9047
        lcar_sales  |
               LD.  |  -.1032728    .251321    -0.41   0.681     -.595853     .38
> 93074
          lTRANSIT  |
               LD.  |   .3879288   .4940193     0.79   0.432    -.5803313     1.3
> 56189
            month2  |   .4053581   .0770497     5.26   0.000     .2543434     .55
> 63728
```

```
             month3 |   .5877568   .0603882     9.73   0.000     .4693981    .70
> 61155
             month4 |   .1816257    .086605     2.10   0.036     .0118831    .35
> 13683
             month5 |   .3689238   .0729407     5.06   0.000     .2259627    .51
> 18849
             month6 |   .0976949   .0704767     1.39   0.166    -.0404369    .23
> 58267
             month7 |    .350481   .0731281     4.79   0.000     .2071525    .49
> 38094
             month8 |   .3419046   .0614672     5.56   0.000     .2214312     .4
> 62378
             month9 |   .0687997   .0663706     1.04   0.300    -.0612844    .19
> 88837
            month10 |   .1983657   .0777461     2.55   0.011     .0459861    .35
> 07453
            month11 |   .2066383   .0854567     2.42   0.016     .0391462    .37
> 41303
            month12 |   .4572979   .0759465     6.02   0.000     .3084455    .60
> 61503
              _cons |  -.0320741   .1117109    -0.29   0.774    -.2510234    .18
> 68753
--------------------+-------------------------------------------------------------
> ------
D_lall_gas
                    |
              _ce1
               L1. |   .0227572   .0196106     1.16   0.246    -.0156789    .06
> 11933
                    |
              _ce2
               L1. |  -.0236798    .030965    -0.76   0.444      -.08437    .03
> 70104
                    |
             lHEV
               LD. |   -.016629   .0372025    -0.45   0.655    -.0895445    .05
> 62865
                    |
          lall_gas
               LD. |   .3747451   .0846692     4.43   0.000     .2087965    .54
> 06938
                    |
  lmiles_travelled
               LD. |   1.312954   5.084647     0.26   0.796     -8.65277    11.
> 27868
                    |
        lcar_sales
               LD. |   .1139661   .0967112     1.18   0.239    -.0755844    .30
> 35166
                    |
```

```
            lTRANSIT |
                 LD. |   .2483547   .1901043     1.31   0.191    -.1242429     .62
> 09523
                     |
              month2 |  -.0017734   .0296496    -0.06   0.952    -.0598856     .05
> 63388
              month3 |    .038835   .0232381     1.67   0.095    -.0067108     .08
> 43808
              month4 |  -.0076288   .0333266    -0.23   0.819    -.0729477     .05
> 76901
              month5 |   .0189412   .0280684     0.67   0.500    -.0360719     .07
> 39543
              month6 |  -.0181894   .0271202    -0.67   0.502    -.0713441     .03
> 49653
              month7 |  -.0203391   .0281405    -0.72   0.470    -.0754936     .03
> 48153
              month8 |  -.0120384   .0236533    -0.51   0.611     -.058398     .03
> 43212
              month9 |  -.0302904   .0255402    -1.19   0.236    -.0803482     .01
> 97675
            month10 |  -.0522494   .0299176    -1.75   0.081    -.1108868      .0
> 06388
            month11 |  -.0292871   .0328847    -0.89   0.373    -.0937399     .03
> 51658
            month12 |  -.0114344   .0292251    -0.39   0.696    -.0687145     .04
> 58458
              _cons |  -.0222895   .0429876    -0.52   0.604    -.1065437     .06
> 19648
--------------------+---------------------------------------------------------------
> ------
D_lmiles_travelled |
                _ce1 |
                 L1. |   .0017021   .0003338     5.10   0.000       .001048     .00
> 23563
                     |
                _ce2 |
                 L1. |  -.0025115    .000527    -4.77   0.000    -.0035444    -.00
> 14785
                     |
                lHEV |
                 LD. |  -.0013273   .0006332    -2.10   0.036    -.0025683    -.00
> 00863
                     |
            lall_gas |
                 LD. |  -.0003965    .001441    -0.28   0.783    -.0032209     .00
> 24278
                     |
  lmiles_travelled |
                 LD. |   .3691014   .0865382     4.27   0.000     .1994896     .53
```

```
> 87131
                    |
        lcar_sales  |
               LD.  |   .0025733    .001646     1.56   0.118    -.0006528    .00
> 57993
                    |
          lTRANSIT  |
               LD.  |  -.0028995   .0032355    -0.90   0.370    -.0092409    .00
> 34419
                    |
             month2 |  -5.95e-06   .0005046    -0.01   0.991     -.000995    .00
> 09831
             month3 |   .0004423   .0003955     1.12   0.263    -.0003329    .00
> 12175
             month4 |   .0016995   .0005672     3.00   0.003     .0005878    .00
> 28112
             month5 |    .000787   .0004777     1.65   0.099    -.0001493    .00
> 17233
             month6 |   .0011372   .0004616     2.46   0.014     .0002326    .00
> 20419
             month7 |   .0008024   .0004789     1.68   0.094    -.0001363    .00
> 17411
             month8 |   .0006231   .0004026     1.55   0.122    -.0001659    .00
> 14121
             month9 |   .0009055   .0004347     2.08   0.037     .0000536    .00
> 17575
            month10 |   .0013751   .0005092     2.70   0.007     .0003771    .00
> 23731
            month11 |   .0015749   .0005597     2.81   0.005      .000478    .00
> 26719
            month12 |   .0006029   .0004974     1.21   0.225     -.000372    .00
> 15778
              _cons |  -.0038492   .0007316    -5.26   0.000    -.0052832   -.00
> 24153
--------------------+-------------------------------------------------------------
> ------
D_lcar_sales        |
              _ce1  |
               L1.  |  -.0140495   .0181058    -0.78   0.438    -.0495362    .02
> 14373
                    |
              _ce2  |
               L1.  |   .0711274   .0285889     2.49   0.013     .0150942    .12
> 71607
                    |
             lHEV   |
               LD.  |   .0791961   .0343478     2.31   0.021     .0118757    .14
> 65166
                    |
```

```
          lall_gas |
               LD. |  -.0116681   .0781723    -0.15   0.881    -.164883    .14
> 15467
                   |
  lmiles_travelled |
               LD. |   14.34136   4.694484     3.05   0.002    5.140343    23.
> 54238
                   |
        lcar_sales |
               LD. |  -.3777788   .0892902    -4.23   0.000   -.5527845   -.20
> 27732
                   |
          lTRANSIT |
               LD. |   .1854544    .175517     1.06   0.291   -.1585526    .52
> 94613
                   |
             month2 |   .0329518   .0273745     1.20   0.229   -.0207012    .08
> 66049
             month3 |   .0087392   .0214549     0.41   0.684   -.0333117    .05
> 07902
             month4 |  -.0041973   .0307693    -0.14   0.891   -.0645041    .05
> 61094
             month5 |    .037835   .0259146     1.46   0.144   -.0129568    .08
> 86267
             month6 |   .0121456   .0250392     0.49   0.628   -.0369304    .06
> 12215
             month7 |   .0470652   .0259812     1.81   0.070   -.0038571    .09
> 79874
             month8 |   .0336984   .0218383     1.54   0.123   -.0091038    .07
> 65007
             month9 |  -.0063882   .0235804    -0.27   0.786    -.052605    .03
> 98285
            month10 |   .0196931   .0276219     0.71   0.476   -.0344449    .07
> 38311
            month11 |   .0327695   .0303614     1.08   0.280   -.0267377    .09
> 22767
            month12 |   .0388061   .0269825     1.44   0.150   -.0140788    .09
> 16909
              _cons |   .0597585   .0396891     1.51   0.132   -.0180306    .13
> 75476
------------------------------------------------------------------------------
> -----
D_lTRANSIT         |
              _ce1 |
               L1. |   .0391737   .0086215     4.54   0.000    .0222758    .05
> 60716
                   |
              _ce2 |
               L1. |  -.026085   .0136133    -1.92   0.055   -.0527666    .00
```

```
> 05966
                    |
             lHEV   |
               LD.  |  -.0820792   .0163555    -5.02   0.000    -.1141355    -.0
> 50023
                    |
         lall_gas   |
               LD.  |   .0476995   .0372236     1.28   0.200    -.0252575     .12
> 06564
                    |
  lmiles_travelled  |
               LD.  |  -6.199873   2.235391    -2.77   0.006    -10.58116   -1.8
> 18587
                    |
        lcar_sales  |
               LD.  |   .0732961   .0425177     1.72   0.085     -.010037     .15
> 66292
                    |
         lTRANSIT   |
               LD.  |   -.214325   .0835766    -2.56   0.010    -.3781321    -.05
> 05179
                    |
            month2  |   -.045777    .013035    -3.51   0.000    -.0713252    -.02
> 02288
            month3  |   .1106899   .0102163    10.83   0.000     .0906663     .13
> 07134
            month4  |   .0459435   .0146515     3.14   0.002      .017227       .
> 07466
            month5  |   .0315998   .0123399     2.56   0.010     .0074141     .05
> 57855
            month6  |   .0005994    .011923     0.05   0.960    -.0227693     .02
> 39681
            month7  |  -.0202002   .0123716    -1.63   0.103    -.0444481     .00
> 40476
            month8  |   .0344683   .0103988     3.31   0.001     .014087     .05
> 48496
            month9  |   .0497111   .0112284     4.43   0.000     .0277039     .07
> 17183
           month10  |    .076427   .0131528     5.81   0.000     .050648     .10
> 22061
           month11  |  -.0248363   .0144573    -1.72   0.086    -.0531721     .00
> 34994
           month12  |  -.0353353   .0128484    -2.75   0.006    -.0605177    -.01
> 01529
             _cons  |  -.0539941   .0188989    -2.86   0.004    -.0910352    -.01
> 69529
--------------------+----------------------------------------------------------------

> ------
```

```
Cointegrating equations

Equation           Parms    chi2     P>chi2
-------------------------------------------
_ce1                   3   37.39154   0.0000
_ce2                   3   25.63262   0.0000
-------------------------------------------

Identification:  beta is exactly identified

                 Johansen normalization restrictions imposed
------------------------------------------------------------------------------
> ----
            beta |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
> al]
-------------------------------------------------------------------------------
> ----
_ce1
            lHEV |          1          .       .       .            .
>   .
        lall_gas |          0  (omitted)
lmiles_travelled |  -10.24932   3.762465    -2.72   0.006    -17.62361    -2.87
> 502
      lcar_sales |  .3630369   .5643836     0.64   0.520    -.7431346    1.469
> 208
        lTRANSIT |  -15.80951   2.714734    -5.82   0.000    -21.13029   -10.48
> 873
           _cons |   357.9377          .       .       .            .
>   .
-------------------------------------------------------------------------------
> ----
_ce2
            lHEV |  -8.33e-17          .       .       .            .
>   .
        lall_gas |          1          .       .       .            .
>   .
lmiles_travelled |  -1.304724    2.59976    -0.50   0.616    -6.400159    3.790
> 712
      lcar_sales |  -.5953793   .3899735    -1.53   0.127    -1.359713    .1689
> 548
        lTRANSIT |  -7.386218   1.875806    -3.94   0.000    -11.06273   -3.709
> 705
           _cons |   119.7772          .       .       .            .
>   .
-------------------------------------------------------------------------------
> ----

390 . *       cirfs
391 . irf create vec1, set(vecintro, replace) step(50)
```

```
(file vecintro.irf created)
(file vecintro.irf now active)
(file vecintro.irf updated)

392 . irf table cirf, impulse(lall_gas) response(lHEV lmiles_travelled lTRANSIT lal
> l_gas lcar_sales) noci
```

Results from vec1

step	(1) cirf	(2) cirf	(3) cirf	(4) cirf	(5) cirf
0	0	0	0	1	0
1	.282242	.020246	-.055372	2.07402	.109962
2	1.32981	.008256	-.127938	3.28986	.310271
3	1.35303	-.032306	-.195673	4.83568	.60065
4	.746897	-.033602	-.208193	6.0481	1.02181
5	1.64632	-.007777	-.218357	7.02753	1.5108
6	3.32607	-.036607	-.2831	8.57735	2.02735
7	3.22823	-.096094	-.326442	10.4882	2.64688
8	2.51405	-.085768	-.28428	11.7908	3.40336
9	4.27175	-.04479	-.257041	12.8438	4.19236
10	6.75485	-.09443	-.314561	14.8245	4.97453
11	6.2761	-.173637	-.324452	17.1714	5.87734
12	5.375	-.136568	-.212364	18.467	6.93102
13	8.40944	-.07345	-.151098	19.549	7.96711
14	11.7805	-.15756	-.217058	22.1042	8.95813
15	10.3895	-.259225	-.187339	24.9192	10.1114
16	9.22362	-.174474	.011396	26.0013	11.4355
17	14.1631	-.085063	.093035	27.0561	12.6653
18	18.4011	-.228112	-.006791	30.4037	13.8105
19	15.2474	-.353492	.075044	33.6839	15.1967
20	13.85	-.189254	.383101	34.2233	16.7751
21	21.673	-.0743	.458812	35.2262	18.1394
22	26.557	-.315457	.290469	39.7171	19.3855
23	20.3529	-.45954	.451521	43.3951	21.0076
24	19.0376	-.167268	.900315	42.8956	22.8337
25	31.2346	-.037785	.923925	43.9147	24.2594
26	36.1408	-.436774	.643098	50.0987	25.5545
27	24.9988	-.58022	.936229	53.9734	27.4444
28	24.6439	-.087464	1.56662	51.7063	29.5181
29	43.4049	.025017	1.45938	53.0035	30.9061
30	46.9428	-.619614	1.01415	61.7071	32.2031
31	28.1839	-.714889	1.53451	65.3145	34.4347
32	30.7108	.083033	2.39408	60.2374	36.7555
33	59.1228	.108551	2.02472	62.4409	37.9634
34	58.5212	-.906119	1.36088	74.854	39.2289
35	28.4896	-.854146	2.27046	77.2443	41.9374

36	**37.6495**	**.394318**	**3.4042**	**67.9153**	**44.4896**
37	**79.8518**	**.194568**	**2.55925**	**72.3056**	**45.3079**
38	**69.961**	**-1.35872**	**1.63484**	**90.0612**	**46.5411**
39	**23.9267**	**-.970723**	**3.19818**	**89.4333**	**49.9495**
40	**46.5563**	**.920174**	**4.62682**	**73.9465**	**52.6753**
41	**107.739**	**.240316**	**2.96798**	**82.9198**	**52.7952**
42	**79.4618**	**-2.06691**	**1.78444**	**108.128**	**54.0643**
43	**11.7743**	**-1.00395**	**4.41872**	**101.248**	**58.5188**
44	**59.7397**	**1.76513**	**6.09483**	**77.2461**	**61.2681**
45	**145.764**	**.158497**	**3.10065**	**95.039**	**60.2415**
46	**83.6618**	**-3.15411**	**1.76319**	**130.202**	**61.7486**
47	**-11.5435**	**-.834019**	**6.10513**	**111.502**	**67.762**
48	**81.5735**	**3.07053**	**7.83109**	**76.3719**	**70.2056**
49	**197.801**	**-.215446**	**2.72116**	**110.164**	**67.3987**
50	**76.5603**	**-4.78202**	**1.54851**	**157.822**	**69.5923**

```
(1) irfname = vec1, impulse = lall_gas, and response = lHEV
(2) irfname = vec1, impulse = lall_gas, and response = lmiles_travelled
(3) irfname = vec1, impulse = lall_gas, and response = lTRANSIT
(4) irfname = vec1, impulse = lall_gas, and response = lall_gas
(5) irfname = vec1, impulse = lall_gas, and response = lcar_sales

393 . irf graph cirf, impulse(lall_gas) response(lHEV lmiles_travelled lTRANSIT lca
    > r_sales) yline(0) level(67)

394 . irf graph irf, impulse(lall_gas) response(lHEV) yline(0) level(67)

395 .
396 . log close
          name:  <unnamed>
           log:  /Users/angelinaolson/Desktop/Paper.smcl
      log type:  smcl
     closed on:  18 Dec 2019, 14:19:05
-------------------------------------------------------------------------------
```