Statistics/Data analysis

```
      name:  <unnamed>
       log:  C:\Users\amcal\Documentos\Clases\3-Econometrics 2\_problem_sets\_ps2\_log
> /log.smcl
  log type:  smcl
 opened on:  18 Mar 2022, 23:29:18

1 .
2 . *ssc install ivreg2
3 . *ssc install ranktest
4 . *ssc install ivregress2
5 . *ssc install estout, replace
6 . use _data/group9.dta

7 .
8 .
9 . //*############################################################################
10. //* Part 2
11. //*############################################################################
12. //*============================================================================
13. //* Setting variable labels
14. //*============================================================================
15.
16. *----- Time variables ------
17. label variable yweek "complete years"

18. label variable periodo1 "seasonality variable"

19. drop week

20. drop periodo2

21.
22. *----- Product variables (pv) ------
23. label variable firm "(pv) ID number of the producer"

24. label variable lsales_volume "(pv) (y) vol sales of i in week t"

25. label variable lprice "log price per i"

26. label variable pri_labe "(pv) 1 if i is from a private label"

27. label variable energy "(pv) calories per 100g"

28. label variable carbo "(pv) sugar per 100g"

29. label variable fat "(pv) fat per 100g"

30. label variable protein "(pv) protein per 100g"

31. label variable flav "(pv) 1 if flavored, 0 if natural or white"

32. label variable cream "(pv) 1 if creamy texture"

33. label variable drink "(pv) 1 if sold in bottles only"

34.
35. *----- Store variables (st) ------
36. label variable hyper "(st) 1 if superstore"
```

```
. label variable poptot "(st) population"

. label variable hhtot "(st) number of hh"

. label variable incometot "(st) total income"

. label variable constot "(st) value of consumption"

. label variable mtot "(st) number of men in market"

. label variable wtot "(st) number of women in market"

. label variable age_pop "(st) average population age"

. label variable sqmtot "(st) total sqrd meters of stores"

. label variable sqm_own "(st) sqrd meters of store"

.
. *Possible instrumental variables (iv)
. label variable energy1 "(iv) avg energy of other products of the same firm"

. label variable carbo1 "(iv) avg carbo of other products of the same firm"

. label variable fat1 "(iv) avg fat of other products of the same firm"

. label variable protein1 "(iv) avg protein of other products of the same firm"

. label variable energy2 "(iv) avg energy of other products of the same and other firm
  > s"

. label variable carbo2 "(iv) avg carb of other products of the same and other firms"

. label variable fat2 "(iv) avg fat of other products of the same and other firms"

. label variable protein2 "(iv) avg protein of other products of the same and other fi
  > rms"

.
.
. //*============================================================================
. //* 1. OLS estimation
. //*============================================================================
.
. //-----generate dummy for firm
. tab firm, gen(firm)
```

(pv) ID number of the producer	Freq.	Percent	Cum.
1	**1,870**	**22.06**	**22.06**
2	**2,710**	**31.98**	**54.04**
3	**1,072**	**12.65**	**66.69**
4	**551**	**6.50**	**73.19**
5	**271**	**3.20**	**76.39**
6	**818**	**9.65**	**86.04**
7	**476**	**5.62**	**91.66**
8	**262**	**3.09**	**94.75**
9	**445**	**5.25**	**100.00**
Total	**8,475**	**100.00**	

```
64. drop firm1

65.
66. tab store, gen(store)
```

store	Freq.	Percent	Cum.
1	442	5.22	5.22
2	396	4.67	9.89
3	390	4.60	14.49
4	386	4.55	19.04
5	395	4.66	23.71
6	429	5.06	28.77
7	439	5.18	33.95
8	434	5.12	39.07
9	443	5.23	44.29
10	451	5.32	49.62
11	449	5.30	54.91
12	448	5.29	60.20
13	442	5.22	65.42
14	441	5.20	70.62
15	444	5.24	75.86
16	450	5.31	81.17
17	398	4.70	85.86
18	398	4.70	90.56
19	402	4.74	95.30
20	398	4.70	100.00
Total	8,475	100.00	

```
67. drop store1

68.
69. save _data/group9_v2 , replace
  file _data/group9_v2.dta saved

70.
71. //-----Test for multicollinearity (energy)
72. reg lsales_volume lprice i.firm pri_label energy carbo fat protein flav cream drink
  note: pri_label omitted because of collinearity.
```

Source	SS	df	MS		
Model	5044.44267	16	315.277667	Number of obs	= 8,475
Residual	6469.95078	8,458	.764950435	F(16, 8458)	= 412.15
				Prob > F	= 0.0000
Total	11514.3934	8,474	1.35879082	R-squared	= 0.4381
				Adj R-squared	= 0.4370
				Root MSE	= .87461

lsales_vol~e	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lprice	-2.949769	.0490519	-60.14	0.000	-3.045923	-2.853615
firm						
2	2.600131	.0595329	43.68	0.000	2.483432	2.71683
3	1.65683	.0634823	26.10	0.000	1.532389	1.781271
4	1.37308	.0536542	25.59	0.000	1.267905	1.478255
5	.8376174	.0681731	12.29	0.000	.7039814	.9712534
6	.1123408	.0447441	2.51	0.012	.0246315	.2000501
7	-1.018032	.0518075	-19.65	0.000	-1.119588	-.9164771
8	-.0840328	.0631598	-1.33	0.183	-.2078415	.0397759
9	-.6301889	.0506593	-12.44	0.000	-.7294934	-.5308844
pri_label	0	(omitted)				
energy	-.0303929	.0105356	-2.88	0.004	-.0510452	-.0097405
carbo	.1975169	.0450635	4.38	0.000	.1091814	.2858523
fat	.3340295	.0971297	3.44	0.001	.1436315	.5244274
protein	-.6558388	.0734923	-8.92	0.000	-.7999017	-.5117759
flav	.0726648	.0479093	1.52	0.129	-.0212492	.1665789
cream	-.2622771	.0442365	-5.93	0.000	-.3489914	-.1755627
drink	-.924203	.076275	-12.12	0.000	-1.073721	-.7746852
_cons	8.660894	.2098742	41.27	0.000	8.249489	9.072299

73. estat vif

Variable	VIF	1/VIF
lprice	**3.44**	**0.290591**
firm		
2	**8.54**	**0.117082**
3	**4.93**	**0.202706**
4	**1.94**	**0.515787**
5	**1.59**	**0.627410**
6	**1.93**	**0.517000**
7	**1.58**	**0.634374**
8	**1.32**	**0.755245**
9	**1.41**	**0.706936**
energy	**707.28**	**0.001414**
carbo	**369.67**	**0.002705**
fat	**296.07**	**0.003378**
protein	**30.65**	**0.032625**
flav	**6.23**	**0.160496**
cream	**3.93**	**0.254423**
drink	**8.63**	**0.115848**
Mean VIF	**90.57**	

74. reg lsales_volume lprice i.firm pri_label carbo fat protein flav cream drink
note: **pri_label** omitted because of collinearity.

Source	SS	df	MS		
Model	**5038.07678**	**15**	**335.871785**	Number of obs	= **8,475**
Residual	**6476.31667**	**8,459**	**.765612563**	F(15, 8459)	= **438.70**
				Prob > F	= **0.0000**
Total	**11514.3934**	**8,474**	**1.35879082**	R-squared	= **0.4375**
				Adj R-squared	= **0.4365**
				Root MSE	= **.87499**

lsales_vol~e	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lprice	**-2.917864**	**.0478095**	**-61.03**	**0.000**	**-3.011582**	**-2.824146**
firm						
2	**2.497036**	**.0476337**	**52.42**	**0.000**	**2.403663**	**2.59041**
3	**1.631249**	**.0628871**	**25.94**	**0.000**	**1.507975**	**1.754523**
4	**1.326036**	**.051138**	**25.93**	**0.000**	**1.225793**	**1.42628**
5	**.8798483**	**.0666116**	**13.21**	**0.000**	**.7492733**	**1.010423**
6	**.1237598**	**.0445879**	**2.78**	**0.006**	**.0363566**	**.211163**
7	**-.9624196**	**.048108**	**-20.01**	**0.000**	**-1.056723**	**-.8681163**
8	**-.1247556**	**.0615887**	**-2.03**	**0.043**	**-.2454846**	**-.0040266**
9	**-.5990884**	**.0495202**	**-12.10**	**0.000**	**-.6961602**	**-.5020167**
pri_label	**0**	(omitted)				
carbo	**.068349**	**.0050877**	**13.43**	**0.000**	**.0583758**	**.0783222**
fat	**.0551336**	**.0093574**	**5.89**	**0.000**	**.0367908**	**.0734763**
protein	**-.8383385**	**.0374184**	**-22.40**	**0.000**	**-.9116876**	**-.7649893**
flav	**.0373449**	**.0463385**	**0.81**	**0.420**	**-.0534899**	**.1281797**
cream	**-.2352654**	**.0432529**	**-5.44**	**0.000**	**-.3200516**	**-.1504792**
drink	**-.9944339**	**.0723167**	**-13.75**	**0.000**	**-1.136192**	**-.8526755**
_cons	**8.933501**	**.1874771**	**47.65**	**0.000**	**8.566**	**9.301002**

```
75. estat vif
```

Variable	VIF	1/VIF
lprice	**3.27**	**0.306155**
firm		
2	**5.46**	**0.183042**
3	**4.84**	**0.206740**
4	**1.76**	**0.568283**
5	**1.52**	**0.657740**
6	**1.92**	**0.521078**
7	**1.36**	**0.736330**
8	**1.26**	**0.794956**
9	**1.35**	**0.740471**
carbo	**4.71**	**0.212402**
fat	**2.75**	**0.364233**
protein	**7.94**	**0.125962**
flav	**5.82**	**0.171710**
cream	**3.75**	**0.266356**
drink	**7.75**	**0.128989**
Mean VIF	**3.70**	

```
76.
77. //-----Test for multicollinearity (pri_label)
78. * variable firm8 gets ommited because of collinearity in the following regression, i
  > ndicating possible correlation between regressors.
79. reg lsales_volume lprice firm2 firm3 firm4 firm5 firm6 firm7 firm8 firm9 pri_label c
  > arbo fat protein flav cream drink
  note: firm8 omitted because of collinearity.
```

Source	SS	df	MS		
Model	**5038.07678**	**15**	**335.871785**	Number of obs	= **8,475**
Residual	**6476.31667**	**8,459**	**.765612563**	F(15, 8459)	= **438.70**
				Prob > F	= **0.0000**
				R-squared	= **0.4375**
				Adj R-squared	= **0.4365**
Total	**11514.3934**	**8,474**	**1.35879082**	Root MSE	= **.87499**

lsales_vol~e	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lprice	**-2.917864**	**.0478095**	**-61.03**	**0.000**	**-3.011582**	**-2.824146**
firm2	**2.621792**	**.069895**	**37.51**	**0.000**	**2.484781**	**2.758803**
firm3	**1.756004**	**.0842663**	**20.84**	**0.000**	**1.590822**	**1.921187**
firm4	**1.450792**	**.0689899**	**21.03**	**0.000**	**1.315555**	**1.586029**
firm5	**1.004604**	**.0844725**	**11.89**	**0.000**	**.8390172**	**1.170191**
firm6	**.2485154**	**.075344**	**3.30**	**0.001**	**.1008229**	**.396208**
firm7	**-.837664**	**.0689395**	**-12.15**	**0.000**	**-.9728022**	**-.7025258**
firm8	**0**	(omitted)				
firm9	**-.4743328**	**.0749194**	**-6.33**	**0.000**	**-.6211931**	**-.3274725**
pri_label	**.1247556**	**.0615887**	**2.03**	**0.043**	**.0040266**	**.2454846**
carbo	**.068349**	**.0050877**	**13.43**	**0.000**	**.0583758**	**.0783222**
fat	**.0551336**	**.0093574**	**5.89**	**0.000**	**.0367908**	**.0734763**
protein	**-.8383385**	**.0374184**	**-22.40**	**0.000**	**-.9116876**	**-.7649893**
flav	**.0373449**	**.0463385**	**0.81**	**0.420**	**-.0534899**	**.1281797**
cream	**-.2352654**	**.0432529**	**-5.44**	**0.000**	**-.3200516**	**-.1504792**
drink	**-.9944339**	**.0723167**	**-13.75**	**0.000**	**-1.136192**	**-.8526755**
_cons	**8.808746**	**.2046875**	**43.04**	**0.000**	**8.407508**	**9.209983**

```
80.
81. *this tab indicates that pri_label is possibly collinear with the set of firm dummie
  > s
82. tab firm pri_label
```

(pv) ID number of the producer	(pv) 1 if i is from a private label		
	0	1	Total
1	**0**	**1,870**	**1,870**
2	**2,710**	**0**	**2,710**
3	**1,072**	**0**	**1,072**
4	**551**	**0**	**551**
5	**271**	**0**	**271**
6	**818**	**0**	**818**
7	**476**	**0**	**476**
8	**262**	**0**	**262**
9	**445**	**0**	**445**
Total	**6,605**	**1,870**	**8,475**

```
83.
84. *we run this regression to identify the exact dependency of pri_label and the firm d
  > ummies. As expected, firm1 and pri_label are a linear combiantion of each other.
85. reg pri_label lprice firm2 firm3 firm4 firm5 firm6 firm7 firm8 firm9 carbo fat prote
  > in flav cream drink
```

Source	SS	df	MS		
Model	**1457.38643**	**15**	**97.1590954**	Number of obs	= **8,475**
Residual	**0**	**8,459**	**0**	F(15, 8459)	= **.**
Total	**1457.38643**	**8,474**	**.171983294**	Prob > F	= **.**
				R-squared	= **1.0000**
				Adj R-squared	= **1.0000**
				Root MSE	= **0**

pri_label	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lprice	**-5.10e-13**	.	.	.	.	.
firm2	**-1**	.	.	.	.	.
firm3	**-1**	.	.	.	.	.
firm4	**-1**	.	.	.	.	.
firm5	**-1**	.	.	.	.	.
firm6	**-1**	.	.	.	.	.
firm7	**-1**	.	.	.	.	.
firm8	**-1**	.	.	.	.	.
firm9	**-1**	.	.	.	.	.
carbo	**4.23e-14**	.	.	.	.	.
fat	**-4.21e-14**	.	.	.	.	.
protein	**-3.42e-13**	.	.	.	.	.
flav	**-4.08e-13**	.	.	.	.	.
cream	**-2.50e-13**	.	.	.	.	.
drink	**-6.34e-13**	.	.	.	.	.
_cons	**1**	.	.	.	.	.

```
86.
87. reg lsales_volume lprice firm2 firm3 firm4 firm5 firm6 firm7 firm8 firm9 carbo fat p
  > rotein flav cream drink
```

Source	SS	df	MS		
Model	**5038.07678**	**15**	**335.871785**	Number of obs	= **8,475**
Residual	**6476.31667**	**8,459**	**.765612563**	F(15, 8459)	= **438.70**
Total	**11514.3934**	**8,474**	**1.35879082**	Prob > F	= **0.0000**
				R-squared	= **0.4375**
				Adj R-squared	= **0.4365**
				Root MSE	= **.87499**

lsales_vol~e	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lprice	-2.917864	.0478095	-61.03	0.000	-3.011582	-2.824146
firm2	2.497036	.0476337	52.42	0.000	2.403663	2.59041
firm3	1.631249	.0628871	25.94	0.000	1.507975	1.754523
firm4	1.326036	.051138	25.93	0.000	1.225793	1.42628
firm5	.8798483	.0666116	13.21	0.000	.7492733	1.010423
firm6	.1237598	.0445879	2.78	0.006	.0363566	.211163
firm7	-.9624196	.048108	-20.01	0.000	-1.056723	-.8681163
firm8	-.1247556	.0615887	-2.03	0.043	-.2454846	-.0040266
firm9	-.5990884	.0495202	-12.10	0.000	-.6961602	-.5020167
carbo	.068349	.0050877	13.43	0.000	.0583758	.0783222
fat	.0551336	.0093574	5.89	0.000	.0367908	.0734763
protein	-.8383385	.0374184	-22.40	0.000	-.9116876	-.7649893
flav	.0373449	.0463385	0.81	0.420	-.0534899	.1281797
cream	-.2352654	.0432529	-5.44	0.000	-.3200516	-.1504792
drink	-.9944339	.0723167	-13.75	0.000	-1.136192	-.8526755
_cons	8.933501	.1874771	47.65	0.000	8.566	9.301002

88.
89. estat vif

Variable	VIF	1/VIF
protein	7.94	0.125962
drink	7.75	0.128989
flav	5.82	0.171710
firm2	5.46	0.183042
firm3	4.84	0.206740
carbo	4.71	0.212402
cream	3.75	0.266356
lprice	3.27	0.306155
fat	2.75	0.364233
firm6	1.92	0.521078
firm4	1.76	0.568283
firm5	1.52	0.657740
firm7	1.36	0.736330
firm9	1.35	0.740471
firm8	1.26	0.794956
Mean VIF	3.70	

90.
91. //-----Test for multicollinearity for store variables
92. * We run this regression to identify the behaviour of variables asociated with the s
> tore, finding high correlation between most of them. We decide to use the variable (
> store) that accurately clusters market information.
93.
94. reg lsales_volume constot sqmtot incometot sqm_own poptot wtot mtot hhtot age_pop hy
> per
note: **wtot** omitted because of collinearity.

Source	SS	df	MS		
Model	1856.7243	9	206.3027	Number of obs	= 8,475
Residual	9657.66915	8,465	1.14089417	F(9, 8465)	= 180.83
Total	11514.3934	8,474	1.35879082	Prob > F	= 0.0000
				R-squared	= 0.1613
				Adj R-squared	= 0.1604
				Root MSE	= 1.0681

lsales_vol~e	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
constot	-1.91e-09	1.60e-10	-11.96	0.000	-2.22e-09	-1.60e-09
sqmtot	6.54e-06	1.96e-06	3.34	0.001	2.70e-06	.0000104
incometot	1.42e-09	1.64e-10	8.70	0.000	1.10e-09	1.74e-09
sqm_own	.0001835	.0000104	17.65	0.000	.0001631	.0002039
poptot	-.0002226	.0000156	-14.22	0.000	-.0002533	-.0001919
wtot	0	(omitted)				
mtot	.000411	.0000311	13.20	0.000	.00035	.000472
hhtot	.0000709	6.60e-06	10.75	0.000	.000058	.0000838
age_pop	.0315504	.0125709	2.51	0.012	.0069083	.0561924
hyper	-.3479976	.0643543	-5.41	0.000	-.4741478	-.2218474
_cons	1.483009	.5550109	2.67	0.008	.3950524	2.570966

95. corr constot sqmtot incometot sqm_own poptot wtot mtot hhtot age_pop hyper
(obs=8,475)

	constot	sqmtot	income~t	sqm_own	poptot	wtot	mtot	hhtot
age_pop	hyper							
constot	1.0000							
sqmtot	0.7685	1.0000						
incometot	0.9976	0.7644	1.0000					
sqm_own	-0.1366	0.0346	-0.1574	1.0000				
poptot	0.9621	0.8507	0.9677	-0.0906	1.0000			
wtot	0.9642	0.8453	0.9704	-0.1011	0.9998	1.0000		
mtot	0.9592	0.8564	0.9641	-0.0784	0.9997	0.9991	1.0000	
hhtot	0.9817	0.7956	0.9881	-0.1247	0.9887	0.9906	0.9860	1.0000
age_pop	0.0147	-0.2800	0.0338	-0.1702	-0.0005	0.0096	-0.0121	0.0760
> 1.0000								
hyper	-0.2681	0.0156	-0.2905	0.8792	-0.2288	-0.2395	-0.2163	-0.2631
> -0.2634	1.0000							

96.
97.
98. //-----Final regression
99.
100 reg lsales_volume lprice i.firm carbo fat protein flav cream drink i.store yweek per
> iodo1, robust

Linear regression

Number of obs	8,475
F(36, 8438)	398.15
Prob > F	0.0000
R-squared	0.5876
Root MSE	.75017

lsales_vol~e	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
lprice	-2.761744	.0464641	-59.44	0.000	-2.852825	-2.670663
firm						
2	2.403648	.043896	54.76	0.000	2.317601	2.489695
3	1.546154	.0460729	33.56	0.000	1.45584	1.636468
4	1.259146	.0461695	27.27	0.000	1.168643	1.34965
5	.8307152	.0521915	15.92	0.000	.7284072	.9330233
6	.007178	.0359776	0.20	0.842	-.0633469	.0777029
7	-.9626098	.0492722	-19.54	0.000	-1.059195	-.8660242
8	-.1542129	.0570626	-2.70	0.007	-.2660697	-.0423562
9	-.6770171	.0394587	-17.16	0.000	-.7543659	-.5996683
carbo	.0680957	.0046469	14.65	0.000	.0589866	.0772049
fat	.066511	.0070832	9.39	0.000	.0526261	.0803958
protein	-.7828116	.0252228	-31.04	0.000	-.8322545	-.7333687
flav	.0706307	.0362908	1.95	0.052	-.0005082	.1417695
cream	-.2327368	.0329929	-7.05	0.000	-.2974109	-.1680627
drink	-.9263451	.0536355	-17.27	0.000	-1.031484	-.8212063

store						
2	-1.716557	.0577715	-29.71	0.000	-1.829804	-1.603311
3	-1.227441	.047652	-25.76	0.000	-1.32085	-1.134031
4	-1.560468	.0537252	-29.05	0.000	-1.665782	-1.455153
5	-.4269861	.0480689	-8.88	0.000	-.5212128	-.3327593
6	-1.177043	.0519738	-22.65	0.000	-1.278924	-1.075161
7	-.7224156	.0526569	-13.72	0.000	-.8256361	-.6191952
8	-.9124313	.0536454	-17.01	0.000	-1.017589	-.8072731
9	-.9529913	.049257	-19.35	0.000	-1.049547	-.8564355
10	-.4809138	.046094	-10.43	0.000	-.5712693	-.3905583
11	-.6570822	.0476977	-13.78	0.000	-.7505813	-.5635831
12	-.4296359	.0494661	-8.69	0.000	-.5266015	-.3326702
13	-.5328462	.0520137	-10.24	0.000	-.6348058	-.4308867
14	-.4463472	.050841	-8.78	0.000	-.546008	-.3466864
15	-1.068495	.0505406	-21.14	0.000	-1.167567	-.969423
16	-.8089759	.0471809	-17.15	0.000	-.901462	-.7164898
17	-1.289708	.0529923	-24.34	0.000	-1.393586	-1.18583
18	-1.085268	.0559956	-19.38	0.000	-1.195033	-.9755024
19	-1.160358	.0512898	-22.62	0.000	-1.260899	-1.059818
20	-1.751382	.0514185	-34.06	0.000	-1.852175	-1.650589
yweek	.0386771	.0271131	1.43	0.154	-.0144711	.0918254
periodo1	.4620996	.250735	1.84	0.065	-.0294025	.9536017
_cons	8.96643	.3841421	23.34	0.000	8.213417	9.719442

```
101
102
103
104
105 *Proof of multicollinearity of energy variable
106 reg sales_volume protein fat carbo energy
```

Source	SS	df	MS		
Model	14067470.2	4	3516867.55	Number of obs	= 8,475
Residual	134939069	8,470	15931.4131	F(4, 8470)	= 220.75
				Prob > F	= 0.0000
Total	149006539	8,474	17583.9673	R-squared	= 0.0944
				Adj R-squared	= 0.0940
				Root MSE	= 126.22

sales_volume	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
protein	-80.27526	4.279816	-18.76	0.000	-88.66474	-71.88578
fat	-130.1625	6.885416	-18.90	0.000	-143.6596	-116.6654
carbo	-60.64236	3.158947	-19.20	0.000	-66.83467	-54.45006
energy	15.91142	.7690404	20.69	0.000	14.40391	17.41893
_cons	66.69998	9.638706	6.92	0.000	47.80576	85.5942

```
107 estat vif
```

Variable	VIF	1/VIF
energy	180.95	0.005526
carbo	87.22	0.011465
fat	71.44	0.013998
protein	4.99	0.200356
Mean VIF	86.15	

```
108 reg sales_volume protein fat carbo
```

Source	SS	df	MS		
Model	7247635.46	3	2415878.49	Number of obs	= 8,475
Residual	141758903	8,471	16734.6126	F(3, 8471)	= 144.36
				Prob > F	= 0.0000
Total	149006539	8,474	17583.9673	R-squared	= 0.0486
				Adj R-squared	= 0.0483
				Root MSE	= 129.36

sales_volume	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
protein	-2.443767	2.09182	-1.17	0.243	-6.544244	1.65671
fat	11.20216	.8730178	12.83	0.000	9.490836	12.91349
carbo	4.284969	.3712746	11.54	0.000	3.55718	5.012757
_cons	34.64846	9.750269	3.55	0.000	15.53556	53.76137

```
109 estat vif
```

Variable	VIF	1/VIF
carbo	1.15	0.871811
protein	1.14	0.880980
fat	1.09	0.914636
Mean VIF	1.13	

```
110
111
112
113
114 //*=============================================================================
115 //* 3. carbo1 as an instrument for log price
116 //*=============================================================================
117
118 reg lprice carbo1 i.firm carbo fat protein flav cream drink i.store yweek periodo1,r
```

Linear regression

Number of obs	= 8,204
F(35, 8168)	= 771.17
Prob > F	= 0.0000
R-squared	= 0.7320
Root MSE	= .18749

lprice	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
carbo1	.0419164	.0082341	5.09	0.000	.0257754	.0580573
firm						
2	.8109974	.0238663	33.98	0.000	.7642133	.8577815
3	.3264041	.0356273	9.16	0.000	.2565656	.3962426
4	.2874075	.0383368	7.50	0.000	.2122577	.3625574
6	.0782615	.0223434	3.50	0.000	.0344627	.1220602
7	-.1716229	.0472507	-3.63	0.000	-.2642462	-.0789996
8	.0756986	.0336546	2.25	0.025	.0097269	.1416702
9	-.2864199	.0368336	-7.78	0.000	-.3586232	-.2142166
carbo	.0185242	.0014529	12.75	0.000	.0156762	.0213723
fat	-.0604889	.001754	-34.49	0.000	-.0639272	-.0570505
protein	-.362417	.0069177	-52.39	0.000	-.3759776	-.3488565
flav	-.2484597	.0095149	-26.11	0.000	-.2671114	-.2298081
cream	.0285245	.0080908	3.53	0.000	.0126646	.0443845
drink	-.4794805	.0140275	-34.18	0.000	-.5069781	-.451983
store						
2	-.1225886	.011772	-10.41	0.000	-.1456647	-.0995125
3	-.0279565	.0123659	-2.26	0.024	-.0521969	-.0037161
4	-.0331322	.0125099	-2.65	0.008	-.0576548	-.0086096
5	-.1560742	.0134333	-11.62	0.000	-.1824069	-.1297414
6	-.0764907	.0129075	-5.93	0.000	-.1017927	-.0511886

7	-.0590474	.0139374	-4.24	0.000	-.0863682	-.0317266
8	-.1096236	.0125028	-8.77	0.000	-.1341322	-.085115
9	-.1135343	.0127338	-8.92	0.000	-.1384958	-.0885728
10	-.1029152	.012011	-8.57	0.000	-.1264598	-.0793707
11	-.0934308	.0128304	-7.28	0.000	-.1185817	-.06828
12	-.2393742	.012526	-19.11	0.000	-.2639284	-.21482
13	-.0970874	.0120858	-8.03	0.000	-.1207785	-.0733962
14	-.0829843	.0123712	-6.71	0.000	-.1072351	-.0587335
15	-.1239367	.013808	-8.98	0.000	-.1510038	-.0968696
16	-.0183928	.0125498	-1.47	0.143	-.0429935	.0062079
17	-.040929	.0133106	-3.07	0.002	-.0670212	-.0148369
18	.0163707	.0128196	1.28	0.202	-.008759	.0415003
19	-.0553325	.0118261	-4.68	0.000	-.0785147	-.0321503
20	-.0111365	.0139596	-0.80	0.425	-.0385009	.0162278
yweek	-.0007679	.0073576	-0.10	0.917	-.0151907	.013655
periodo1	.0321629	.0676868	0.48	0.635	-.1005205	.1648463
_cons	2.077499	.1305234	15.92	0.000	1.82164	2.333358

```
119 test carbo1

 ( 1)  carbo1 = 0

       F(  1,  8168) =   25.91
            Prob > F =    0.0000

120
121 esttab using _output/regcarbo1.tex, title("Testing carbo1 relevance as an IV") se ke
  > ep(carbo1) replace
  (output written to _output/regcarbo1.tex)

122
123 //*============================================================================
124 //* 4. Two stage least square approach
125 //*============================================================================
126
127 *Regression using two stage least square manually
128 reg lprice carbo1 i.firm carbo fat protein flav cream drink i.store yweek periodo1,
  > r

Linear regression                               Number of obs     =      8,204
                                                F(35, 8168)       =     771.17
                                                Prob > F          =     0.0000
                                                R-squared         =     0.7320
                                                Root MSE          =     .18749
```

lprice	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
carbo1	.0419164	.0082341	5.09	0.000	.0257754	.0580573
firm						
2	.8109974	.0238663	33.98	0.000	.7642133	.8577815
3	.3264041	.0356273	9.16	0.000	.2565656	.3962426
4	.2874075	.0383368	7.50	0.000	.2122577	.3625574
6	.0782615	.0223434	3.50	0.000	.0344627	.1220602
7	-.1716229	.0472507	-3.63	0.000	-.2642462	-.0789996
8	.0756986	.0336546	2.25	0.025	.0097269	.1416702
9	-.2864199	.0368336	-7.78	0.000	-.3586232	-.2142166
carbo	.0185242	.0014529	12.75	0.000	.0156762	.0213723
fat	-.0604889	.001754	-34.49	0.000	-.0639272	-.0570505
protein	-.362417	.0069177	-52.39	0.000	-.3759776	-.3488565
flav	-.2484597	.0095149	-26.11	0.000	-.2671114	-.2298081
cream	.0285245	.0080908	3.53	0.000	.0126646	.0443845
drink	-.4794805	.0140275	-34.18	0.000	-.5069781	-.451983
store						
2	-.1225886	.011772	-10.41	0.000	-.1456647	-.0995125
3	-.0279565	.0123659	-2.26	0.024	-.0521969	-.0037161

4	-.0331322	.0125099	-2.65	0.008	-.0576548	-.0086096
5	-.1560742	.0134333	-11.62	0.000	-.1824069	-.1297414
6	-.0764907	.0129075	-5.93	0.000	-.1017927	-.0511886
7	-.0590474	.0139374	-4.24	0.000	-.0863682	-.0317266
8	-.1096236	.0125028	-8.77	0.000	-.1341322	-.085115
9	-.1135343	.0127338	-8.92	0.000	-.1384958	-.0885728
10	-.1029152	.012011	-8.57	0.000	-.1264598	-.0793707
11	-.0934308	.0128304	-7.28	0.000	-.1185817	-.06828
12	-.2393742	.012526	-19.11	0.000	-.2639284	-.21482
13	-.0970874	.0120858	-8.03	0.000	-.1207785	-.0733962
14	-.0829843	.0123712	-6.71	0.000	-.1072351	-.0587335
15	-.1239367	.013808	-8.98	0.000	-.1510038	-.0968696
16	-.0183928	.0125498	-1.47	0.143	-.0429935	.0062079
17	-.040929	.0133106	-3.07	0.002	-.0670212	-.0148369
18	.0163707	.0128196	1.28	0.202	-.008759	.0415003
19	-.0553325	.0118261	-4.68	0.000	-.0785147	-.0321503
20	-.0111365	.0139596	-0.80	0.425	-.0385009	.0162278
yweek	-.0007679	.0073576	-0.10	0.917	-.0151907	.013655
periodo1	.0321629	.0676868	0.48	0.635	-.1005205	.1648463
_cons	2.077499	.1305234	15.92	0.000	1.82164	2.333358

```
129 estimate store reg_first

130 predict lprice_hat
  (option xb assumed; fitted values)
  (271 missing values generated)

131
132 reg lsales_volume lprice_hat i.firm carbo fat protein flav cream drink i.store yweek
  >  periodo1, r
```

Linear regression

Number of obs	8,204
F(35, 8168)	162.36
Prob > F	0.0000
R-squared	0.3925
Root MSE	.90983

lsales_vol~e	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
lprice_hat	-9.273616	.9320425	-9.95	0.000	-11.10066	-7.446576
firm						
2	6.96056	.6509299	10.69	0.000	5.684571	8.236548
3	4.820503	.468671	10.29	0.000	3.901789	5.739217
4	4.389631	.4479774	9.80	0.000	3.511481	5.26778
6	-.1564931	.0518711	-3.02	0.003	-.2581736	-.0548126
7	-.5327626	.0896871	-5.94	0.000	-.7085721	-.3569531
8	1.372329	.233101	5.89	0.000	.9153915	1.829266
9	-1.340885	.111127	-12.07	0.000	-1.558722	-1.123048
carbo	.1567847	.0132103	11.87	0.000	.1308892	.1826802
fat	-.333724	.0580101	-5.75	0.000	-.4474384	-.2200095
protein	-3.11597	.3328431	-9.36	0.000	-3.768427	-2.463513
flav	-1.606483	.2425028	-6.62	0.000	-2.08185	-1.131116
cream	-.0897439	.0457498	-1.96	0.050	-.1794252	-.0000627
drink	-4.057723	.4502012	-9.01	0.000	-4.940232	-3.175214
store						
2	-2.520549	.1324422	-19.03	0.000	-2.78017	-2.260929
3	-1.417652	.062875	-22.55	0.000	-1.540903	-1.2944
4	-1.779105	.070651	-25.18	0.000	-1.917599	-1.640611
5	-1.425348	.1543692	-9.23	0.000	-1.727951	-1.122745
6	-1.692295	.0956344	-17.70	0.000	-1.879762	-1.504827
7	-1.120663	.0844304	-13.27	0.000	-1.286168	-.9551574
8	-1.624641	.1195559	-13.59	0.000	-1.859002	-1.390281
9	-1.689915	.1220724	-13.84	0.000	-1.929208	-1.450622
10	-1.139464	.1086533	-10.49	0.000	-1.352452	-.9264755
11	-1.263807	.1033534	-12.23	0.000	-1.466406	-1.061208

12	-1.984172	.2315372	-8.57	0.000	-2.438044	-1.5303
13	-1.17385	.1120221	-10.48	0.000	-1.393442	-.9542586
14	-.9859489	.097483	-10.11	0.000	-1.17704	-.7948573
15	-1.884558	.1273698	-14.80	0.000	-2.134235	-1.63488
16	-.9262436	.0605803	-15.29	0.000	-1.044996	-.8074909
17	-1.538271	.0707738	-21.74	0.000	-1.677006	-1.399536
18	-.9764032	.0678995	-14.38	0.000	-1.109504	-.8433029
19	-1.515963	.0807976	-18.76	0.000	-1.674346	-1.357579
20	-1.831419	.0662254	-27.65	0.000	-1.961238	-1.7016
yweek	.0365277	.0340337	1.07	0.283	-.0301871	.1032425
periodo1	.6828509	.3160852	2.16	0.031	.0632435	1.302458
_cons	25.36356	2.387717	10.62	0.000	20.68303	30.04409

```
133 estimate store reg_second

134
135 esttab using _output/pricehat.tex, title("Manual estimation of log prices coefficien
  > t") se keep(lprice_hat) replace
  (output written to _output/pricehat.tex)

136
137 *Regression using ivreg2 command
138 ivreg2 lsales_volume i.firm carbo fat protein flav cream drink i.store yweek periodo
  > 1 (lprice = carbo1), endog(lprice)

  IV (2SLS) estimation
  --------------------

  Estimates efficient for homoskedasticity only
  Statistics consistent for homoskedasticity only

                                                      Number of obs =      8204
                                                      F( 35,  8168) =     60.17
                                                      Prob > F      =    0.0000
  Total (centered) SS     =  11129.76652              Centered R2   =   -0.5224
  Total (uncentered) SS   =  134402.4702              Uncentered R2 =    0.8739
  Residual SS             =   16944.0879              Root MSE      =     1.437
```

lsales_vol~e	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
lprice	-9.273611	1.626859	-5.70	0.000	-12.4622	-6.085026
firm						
2	6.960556	1.139841	6.11	0.000	4.726509	9.194603
3	4.8205	.8234954	5.85	0.000	3.206479	6.434522
4	4.389628	.7856694	5.59	0.000	2.849745	5.929512
6	-.1564929	.0842755	-1.86	0.063	-.3216698	.0086839
7	-.5327629	.133039	-4.00	0.000	-.7935145	-.2720113
8	1.372328	.393875	3.48	0.000	.6003469	2.144309
9	-1.340885	.1850711	-7.25	0.000	-1.703617	-.9781519
carbo	.1567846	.0236681	6.62	0.000	.110396	.2031732
fat	-.3337237	.1010287	-3.30	0.001	-.5317363	-.135711
protein	-3.115969	.5855311	-5.32	0.000	-4.263588	-1.968349
flav	-1.606481	.4254172	-3.78	0.000	-2.440284	-.772679
cream	-.089744	.0795611	-1.13	0.259	-.2456809	.0661929
drink	-4.05772	.7905233	-5.13	0.000	-5.607118	-2.508323
store						
2	-2.520549	.2244093	-11.23	0.000	-2.960383	-2.080714
3	-1.417651	.1124515	-12.61	0.000	-1.638052	-1.19725
4	-1.779104	.1165599	-15.26	0.000	-2.007558	-1.550651
5	-1.425347	.2743739	-5.19	0.000	-1.96311	-.8875842
6	-1.692294	.159252	-10.63	0.000	-2.004422	-1.380166
7	-1.120662	.137099	-8.17	0.000	-1.389371	-.8519533
8	-1.624641	.2035731	-7.98	0.000	-2.023637	-1.225645
9	-1.689914	.2091252	-8.08	0.000	-2.099792	-1.280037
10	-1.139463	.1935237	-5.89	0.000	-1.518763	-.7601637
11	-1.263807	.1806477	-7.00	0.000	-1.61787	-.9097436

12	-1.984171	.4013758	-4.94	0.000	-2.770853	-1.197489
13	-1.17385	.1858229	-6.32	0.000	-1.538056	-.8096438
14	-.9859484	.1666791	-5.92	0.000	-1.312633	-.6592634
15	-1.884557	.2236529	-8.43	0.000	-2.322909	-1.446205
16	-.9262435	.1021185	-9.07	0.000	-1.126392	-.7260949
17	-1.538271	.1217217	-12.64	0.000	-1.776841	-1.299701
18	-.9764033	.1040638	-9.38	0.000	-1.180365	-.772442
19	-1.515962	.1356697	-11.17	0.000	-1.78187	-1.250055
20	-1.831419	.1033102	-17.73	0.000	-2.033903	-1.628935
yweek	.0365277	.0537133	0.68	0.496	-.0687484	.1418038
periodo1	.682851	.4981249	1.37	0.170	-.293456	1.659158
_cons	25.36355	4.176976	6.07	0.000	17.17683	33.55027

Underidentification test (Anderson canon. corr. LM statistic): **22.236**
Chi-sq(**1**) P-val = **0.0000**

Weak identification test (Cragg-Donald Wald F statistic): **22.199**
Stock-Yogo weak ID test critical values: 10% maximal IV size **16.38**
15% maximal IV size **8.96**
20% maximal IV size **6.66**
25% maximal IV size **5.53**
Source: Stock-Yogo (2005). Reproduced by permission.

Sargan statistic (overidentification test of all instruments): **0.000**
(equation exactly identified)

-endog- option:
Endogeneity test of endogenous regressors: **58.722**
Chi-sq(**1**) P-val = **0.0000**
Regressors tested: lprice

Instrumented: lprice
Included instruments: 2.firm 3.firm 4.firm 6.firm 7.firm 8.firm 9.firm carbo fat protein flav cream drink 2.store 3.store 4.store 5.store 6.store 7.store 8.store 9.store 10.store 11.store 12.store 13.store 14.store 15.store 16.store 17.store 18.store 19.store 20.store yweek periodo1
Excluded instruments: carbo1

```
139
140 esttab using _output/pricehativreg.tex, title("Estimation of log prices coefficient
  > from ivreg2") se keep(lprice) replace
  (output written to _output/pricehativreg.tex)

141
142
143 //*============================================================================
144 //* 5. Endogeneity of log price
145 //*============================================================================
146
147 *Manual Hausman test for endogeneity of lprice
148 reg lprice carbo1 i.firm carbo fat protein flav cream drink i.store yweek periodo1,
  > r

  Linear regression                               Number of obs     =      8,204
                                                  F(35, 8168)       =     771.17
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.7320
                                                  Root MSE          =     .18749
```

lprice	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
carbo1	.0419164	.0082341	5.09	0.000	.0257754	.0580573
firm						
2	.8109974	.0238663	33.98	0.000	.7642133	.8577815
3	.3264041	.0356273	9.16	0.000	.2565656	.3962426
4	.2874075	.0383368	7.50	0.000	.2122577	.3625574
6	.0782615	.0223434	3.50	0.000	.0344627	.1220602
7	-.1716229	.0472507	-3.63	0.000	-.2642462	-.0789996
8	.0756986	.0336546	2.25	0.025	.0097269	.1416702
9	-.2864199	.0368336	-7.78	0.000	-.3586232	-.2142166
carbo	.0185242	.0014529	12.75	0.000	.0156762	.0213723
fat	-.0604889	.001754	-34.49	0.000	-.0639272	-.0570505
protein	-.362417	.0069177	-52.39	0.000	-.3759776	-.3488565
flav	-.2484597	.0095149	-26.11	0.000	-.2671114	-.2298081
cream	.0285245	.0080908	3.53	0.000	.0126646	.0443845
drink	-.4794805	.0140275	-34.18	0.000	-.5069781	-.451983
store						
2	-.1225886	.011772	-10.41	0.000	-.1456647	-.0995125
3	-.0279565	.0123659	-2.26	0.024	-.0521969	-.0037161
4	-.0331322	.0125099	-2.65	0.008	-.0576548	-.0086096
5	-.1560742	.0134333	-11.62	0.000	-.1824069	-.1297414
6	-.0764907	.0129075	-5.93	0.000	-.1017927	-.0511886
7	-.0590474	.0139374	-4.24	0.000	-.0863682	-.0317266
8	-.1096236	.0125028	-8.77	0.000	-.1341322	-.085115
9	-.1135343	.0127338	-8.92	0.000	-.1384958	-.0885728
10	-.1029152	.012011	-8.57	0.000	-.1264598	-.0793707
11	-.0934308	.0128304	-7.28	0.000	-.1185817	-.06828
12	-.2393742	.012526	-19.11	0.000	-.2639284	-.21482
13	-.0970874	.0120858	-8.03	0.000	-.1207785	-.0733962
14	-.0829843	.0123712	-6.71	0.000	-.1072351	-.0587335
15	-.1239367	.013808	-8.98	0.000	-.1510038	-.0968696
16	-.0183928	.0125498	-1.47	0.143	-.0429935	.0062079
17	-.040929	.0133106	-3.07	0.002	-.0670212	-.0148369
18	.0163707	.0128196	1.28	0.202	-.008759	.0415003
19	-.0553325	.0118261	-4.68	0.000	-.0785147	-.0321503
20	-.0111365	.0139596	-0.80	0.425	-.0385009	.0162278
yweek	-.0007679	.0073576	-0.10	0.917	-.0151907	.013655
periodo1	.0321629	.0676868	0.48	0.635	-.1005205	.1648463
_cons	2.077499	.1305234	15.92	0.000	1.82164	2.333358

```
149 predict v, resid
  (271 missing values generated)

150
151 reg lsales_volume lprice i.firm carbo fat protein flav cream drink i.store yweek per
  > iodo1 v, r
```

Linear regression

Number of obs	=	8,204
F(36, 8167)	=	374.14
Prob > F	=	0.0000
R-squared	=	0.5840
Root MSE	=	.75291

lsales_vol~e	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
lprice	-9.273611	.8360334	-11.09	0.000	-10.91245	-7.634773
firm						
2	6.960556	.5857335	11.88	0.000	5.812369	8.108743
3	4.8205	.4187054	11.51	0.000	3.999731	5.64127
4	4.389628	.4024851	10.91	0.000	3.600655	5.178602
6	-.1564929	.0428976	-3.65	0.000	-.2405831	-.0724028
7	-.5327629	.0736954	-7.23	0.000	-.6772247	-.3883011
8	1.372328	.2042963	6.72	0.000	.971855	1.7728
9	-1.340885	.0949385	-14.12	0.000	-1.526988	-1.154781
carbo	.1567846	.0123353	12.71	0.000	.1326044	.1809649
fat	-.3337236	.0514883	-6.48	0.000	-.4346539	-.2327934
protein	-3.115968	.2972093	-10.48	0.000	-3.698574	-2.533363
flav	-1.606481	.2160243	-7.44	0.000	-2.029944	-1.183019
cream	-.089744	.038477	-2.33	0.020	-.1651687	-.0143194
drink	-4.05772	.4003998	-10.13	0.000	-4.842606	-3.272835
store						
2	-2.520549	.1221701	-20.63	0.000	-2.760033	-2.281064
3	-1.417651	.0546002	-25.96	0.000	-1.524682	-1.310621
4	-1.779104	.0620748	-28.66	0.000	-1.900787	-1.657422
5	-1.425347	.1404867	-10.15	0.000	-1.700737	-1.149957
6	-1.692294	.0833713	-20.30	0.000	-1.855723	-1.528865
7	-1.120662	.0717538	-15.62	0.000	-1.261318	-.9800065
8	-1.624641	.1034332	-15.71	0.000	-1.827396	-1.421886
9	-1.689914	.1073195	-15.75	0.000	-1.900288	-1.479541
10	-1.139463	.0971494	-11.73	0.000	-1.329901	-.9490256
11	-1.263807	.090326	-13.99	0.000	-1.440869	-1.086745
12	-1.984171	.2060504	-9.63	0.000	-2.388082	-1.58026
13	-1.17385	.0982978	-11.94	0.000	-1.366539	-.9811611
14	-.9859484	.0865369	-11.39	0.000	-1.155583	-.8163141
15	-1.884557	.1153118	-16.34	0.000	-2.110598	-1.658516
16	-.9262435	.0500227	-18.52	0.000	-1.024301	-.8281863
17	-1.538271	.0641247	-23.99	0.000	-1.663971	-1.41257
18	-.9764033	.05946	-16.42	0.000	-1.09296	-.8598465
19	-1.515962	.0688114	-22.03	0.000	-1.65085	-1.381074
20	-1.831419	.0534492	-34.26	0.000	-1.936193	-1.726645
yweek	.0365277	.0276227	1.32	0.186	-.0176198	.0906752
periodo1	.682851	.256794	2.66	0.008	.1794695	1.186233
v	6.548875	.8380469	7.81	0.000	4.90609	8.191661
_cons	25.36355	2.130253	11.91	0.000	21.18771	29.53939

```
152
153 *Endog command for endogeneity
154 ivreg2 lsales_volume i.firm carbo fat protein flav cream drink i.store yweek periodo
  > 1 (lprice = carbo1), endog(lprice)

  IV (2SLS) estimation
  --------------------

  Estimates efficient for homoskedasticity only
  Statistics consistent for homoskedasticity only

                                                      Number of obs =      8204
                                                      F( 35,  8168) =     60.17
                                                      Prob > F      =    0.0000
  Total (centered) SS     =  11129.76652              Centered R2   =   -0.5224
  Total (uncentered) SS   =  134402.4702              Uncentered R2 =    0.8739
  Residual SS             =   16944.0879              Root MSE      =     1.437
```

lsales_vol~e	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
lprice	-9.273611	1.626859	-5.70	0.000	-12.4622	-6.085026
firm						
2	6.960556	1.139841	6.11	0.000	4.726509	9.194603
3	4.8205	.8234954	5.85	0.000	3.206479	6.434522
4	4.389628	.7856694	5.59	0.000	2.849745	5.929512
6	-.1564929	.0842755	-1.86	0.063	-.3216698	.0086839
7	-.5327629	.133039	-4.00	0.000	-.7935145	-.2720113
8	1.372328	.393875	3.48	0.000	.6003469	2.144309
9	-1.340885	.1850711	-7.25	0.000	-1.703617	-.9781519
carbo	.1567846	.0236681	6.62	0.000	.110396	.2031732
fat	-.3337237	.1010287	-3.30	0.001	-.5317363	-.135711
protein	-3.115969	.5855311	-5.32	0.000	-4.263588	-1.968349
flav	-1.606481	.4254172	-3.78	0.000	-2.440284	-.772679
cream	-.089744	.0795611	-1.13	0.259	-.2456809	.0661929
drink	-4.05772	.7905233	-5.13	0.000	-5.607118	-2.508323
store						
2	-2.520549	.2244093	-11.23	0.000	-2.960383	-2.080714
3	-1.417651	.1124515	-12.61	0.000	-1.638052	-1.19725
4	-1.779104	.1165599	-15.26	0.000	-2.007558	-1.550651
5	-1.425347	.2743739	-5.19	0.000	-1.96311	-.8875842
6	-1.692294	.159252	-10.63	0.000	-2.004422	-1.380166
7	-1.120662	.137099	-8.17	0.000	-1.389371	-.8519533
8	-1.624641	.2035731	-7.98	0.000	-2.023637	-1.225645
9	-1.689914	.2091252	-8.08	0.000	-2.099792	-1.280037
10	-1.139463	.1935237	-5.89	0.000	-1.518763	-.7601637
11	-1.263807	.1806477	-7.00	0.000	-1.61787	-.9097436
12	-1.984171	.4013758	-4.94	0.000	-2.770853	-1.197489
13	-1.17385	.1858229	-6.32	0.000	-1.538056	-.8096438
14	-.9859484	.1666791	-5.92	0.000	-1.312633	-.6592634
15	-1.884557	.2236529	-8.43	0.000	-2.322909	-1.446205
16	-.9262435	.1021185	-9.07	0.000	-1.126392	-.7260949
17	-1.538271	.1217217	-12.64	0.000	-1.776841	-1.299701
18	-.9764033	.1040638	-9.38	0.000	-1.180365	-.772442
19	-1.515962	.1356697	-11.17	0.000	-1.78187	-1.250055
20	-1.831419	.1033102	-17.73	0.000	-2.033903	-1.628935
yweek	.0365277	.0537133	0.68	0.496	-.0687484	.1418038
periodo1	.682851	.4981249	1.37	0.170	-.293456	1.659158
_cons	25.36355	4.176976	6.07	0.000	17.17683	33.55027

Underidentification test (Anderson canon. corr. LM statistic): **22.236**
Chi-sq(**1**) P-val = **0.0000**

Weak identification test (Cragg-Donald Wald F statistic): **22.199**
Stock-Yogo weak ID test critical values: 10% maximal IV size **16.38**
15% maximal IV size **8.96**
20% maximal IV size **6.66**
25% maximal IV size **5.53**
Source: Stock-Yogo (2005). Reproduced by permission.

Sargan statistic (overidentification test of all instruments): **0.000**
(equation exactly identified)

-endog- option:
Endogeneity test of endogenous regressors: **58.722**
Chi-sq(**1**) P-val = **0.0000**
Regressors tested: lprice

Instrumented: lprice
Included instruments: 2.firm 3.firm 4.firm 6.firm 7.firm 8.firm 9.firm carbo fat protein flav cream drink 2.store 3.store 4.store 5.store 6.store 7.store 8.store 9.store 10.store 11.store 12.store 13.store 14.store 15.store 16.store 17.store 18.store 19.store 20.store yweek periodo1
Excluded instruments: carbo1

```
155
156
157 //*#########################################################################
158 //* Part 3
159 //*#########################################################################
160
161 //*=========================================================================
162 //* 1. Joint relevance of instruments
163 //*=========================================================================
164 *We drop energy1 and energy2 as it is a linear combination of the variables on their
  >  respective groups of IV 1 and 2
165
166 *We run a regression for lprice taking into account all the available instruments
167
168  reg lprice protein1 fat1 protein2 carbo2 fat2 carbo1 i.firm carbo fat protein flav
  > cream drink i.store yweek periodo1, r
  note: 7.firm omitted because of collinearity.
  note: 8.firm omitted because of collinearity.
  note: 9.firm omitted because of collinearity.

  Linear regression                               Number of obs     =      8,204
                                                  F(37, 8166)       =     877.54
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.7475
                                                  Root MSE          =     .18201

------------------------------------------------------------------------------
             |               Robust
      lprice |  Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
    protein1 |  -1.716272   .0716632   -23.95   0.000     -1.85675   -1.575793
       fat1  |  -.2527686   .0111458   -22.68   0.000     -.2746172   -.2309199
    protein2 |  -45.57667   1.607029   -28.36   0.000     -48.72685   -42.42648
      carbo2 |   6.728587   .2804263    23.99   0.000      6.17888    7.278294
       fat2  |  -20.14092   .9046152   -22.26   0.000     -21.91419   -18.36764
      carbo1 |  -.1084328    .010278   -10.55   0.000     -.1285804   -.0882852
             |
        firm |
          2  |  -2.890214   .1560522   -18.52   0.000     -3.196116   -2.584312
          3  |  -6.678234   .3232387   -20.66   0.000     -7.311864   -6.044604
          4  |   .1454823   .0163935     8.87   0.000      .1133468    .1776179
          6  |  -5.606598   .2091497   -26.81   0.000     -6.016585   -5.196611
          7  |          0  (omitted)
          8  |          0  (omitted)
          9  |          0  (omitted)
             |
       carbo |  -.0002025   .0016934    -0.12   0.905     -.0035221     .003117
         fat |  -.0978006   .0026812   -36.48   0.000     -.1030565   -.0925446
     protein |  -.6235371   .0127489   -48.91   0.000     -.6485281    -.598546
        flav |  -.2259904    .009178   -24.62   0.000     -.2439817   -.2079991
       cream |  -.0810371    .008116    -9.98   0.000     -.0969466   -.0651277
       drink |   -.544596   .0131311   -41.47   0.000     -.5703363   -.5188558
             |
       store |
          2  |  -.1217948   .0111396   -10.93   0.000     -.1436313   -.0999583
          3  |  -.0285191   .0120117    -2.37   0.018     -.0520651    -.004973
          4  |  -.0340083   .0122579    -2.77   0.006      -.058037   -.0099797
          5  |  -.1629017   .0127808   -12.75   0.000     -.1879554    -.137848
          6  |  -.0740762   .0123964    -5.98   0.000     -.0983763   -.0497761
          7  |  -.0585589   .0133803    -4.38   0.000     -.0847878     -.03233
          8  |  -.1090486   .0117188    -9.31   0.000     -.1320204   -.0860769
          9  |  -.1130455   .0122552    -9.22   0.000     -.1370687   -.0890222
         10  |  -.1018833   .0115379    -8.83   0.000     -.1245006    -.079266
         11  |  -.0937926   .0123106    -7.62   0.000     -.1179245   -.0696606
         12  |  -.2391834   .0119158   -20.07   0.000     -.2625413   -.2158254
         13  |  -.0970732   .0116004    -8.37   0.000      -.119813   -.0743335
         14  |  -.0837174   .0117352    -7.13   0.000     -.1067214   -.0607134
         15  |  -.1232526   .0134525    -9.16   0.000      -.149623   -.0968822
         16  |  -.0188963   .0122194    -1.55   0.122     -.0428495    .0050569
         17  |  -.0418826   .0129092    -3.24   0.001      -.067188   -.0165773
         18  |   .0141307   .0124057     1.14   0.255     -.0101876    .0384491
         19  |  -.0547991   .0114992    -4.77   0.000     -.0773405   -.0322577
```

20	-.0119532	.0136488	-0.88	0.381	-.0387082	.0148019
yweek	-.0009188	.0071446	-0.13	0.898	-.014924	.0130865
periodo1	.0307048	.065682	0.47	0.640	-.0980487	.1594583
_cons	150.5766	5.05194	29.81	0.000	140.6735	160.4797

```
169
170 *The results show collinearity with some of the firms. We drop the second group of I
  > V for which the collinearity arises
171
172 reg lprice protein1 fat1 carbo1 i.firm carbo fat protein flav cream drink i.store yw
  > eek periodo1, r
```

Linear regression

Number of obs	=	8,204
F(37, 8166)	=	877.55
Prob > F	=	0.0000
R-squared	=	0.7475
Root MSE	=	.18201

lprice	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
protein1	-1.716272	.0716632	-23.95	0.000	-1.85675	-1.575793
fat1	-.2527686	.0111458	-22.68	0.000	-.2746172	-.2309199
carbo1	-.1084328	.010278	-10.55	0.000	-.1285804	-.0882852
firm						
2	.739796	.0231145	32.01	0.000	.6944856	.7851064
3	4.298839	.165389	25.99	0.000	3.974635	4.623044
4	1.271564	.054749	23.23	0.000	1.164242	1.378886
6	.8284288	.0388444	21.33	0.000	.7522838	.9045737
7	1.031016	.0698808	14.75	0.000	.8940316	1.168
8	1.126081	.0541497	20.80	0.000	1.019934	1.232229
9	.6030277	.049042	12.30	0.000	.5068928	.6991626
carbo	-.0002025	.0016934	-0.12	0.905	-.0035221	.003117
fat	-.0978006	.0026812	-36.48	0.000	-.1030565	-.0925446
protein	-.6235371	.0127489	-48.91	0.000	-.6485281	-.598546
flav	-.2259904	.009178	-24.62	0.000	-.2439817	-.2079991
cream	-.0810371	.008116	-9.98	0.000	-.0969466	-.0651277
drink	-.544596	.0131311	-41.47	0.000	-.5703363	-.5188558
store						
2	-.1217948	.0111396	-10.93	0.000	-.1436313	-.0999583
3	-.0285191	.0120117	-2.37	0.018	-.0520651	-.004973
4	-.0340083	.0122579	-2.77	0.006	-.058037	-.0099797
5	-.1629017	.0127808	-12.75	0.000	-.1879554	-.137848
6	-.0740762	.0123964	-5.98	0.000	-.0983763	-.0497761
7	-.0585589	.0133803	-4.38	0.000	-.0847878	-.03233
8	-.1090486	.0117188	-9.31	0.000	-.1320204	-.0860769
9	-.1130455	.0122552	-9.22	0.000	-.1370687	-.0890222
10	-.1018833	.0115379	-8.83	0.000	-.1245006	-.079266
11	-.0937926	.0123106	-7.62	0.000	-.1179245	-.0696606
12	-.2391834	.0119158	-20.07	0.000	-.2625413	-.2158254
13	-.0970732	.0116004	-8.37	0.000	-.119813	-.0743335
14	-.0837174	.0117352	-7.13	0.000	-.1067214	-.0607134
15	-.1232526	.0134525	-9.16	0.000	-.149623	-.0968822
16	-.0188963	.0122194	-1.55	0.122	-.0428495	.0050569
17	-.0418826	.0129092	-3.24	0.001	-.067188	-.0165773
18	.0141307	.0124057	1.14	0.255	-.0101876	.0384491
19	-.0547991	.0114992	-4.77	0.000	-.0773405	-.0322577
20	-.0119532	.0136488	-0.88	0.381	-.0387082	.0148019
yweek	-.0009188	.0071446	-0.13	0.898	-.014924	.0130865
periodo1	.0307048	.065682	0.47	0.640	-.0980487	.1594583
_cons	10.83894	.3833201	28.28	0.000	10.08754	11.59035

```
173
174 esttab using _output/regIV1.tex, title("Regression of lprice on IV of group 1") se k
  > eep(carbo1 fat1 protein1) replace
  (output written to _output/regIV1.tex)

175
176
177
178 //*============================================================================
179 //* 2. Estimation with ivreg2
180 //*============================================================================
181
182 ivreg2 lsales_volume i.firm carbo fat protein flav cream drink i.store yweek periodo
  > 1 (lprice = carbo1 protein1 fat1), endog(lprice)

  IV (2SLS) estimation
  --------------------

  Estimates efficient for homoskedasticity only
  Statistics consistent for homoskedasticity only

                                                      Number of obs =      8204
                                                      F( 35,  8168) =    180.45
                                                      Prob > F      =    0.0000
  Total (centered) SS     =  11129.76652              Centered R2   =    0.4983
  Total (uncentered) SS   =  134402.4702              Uncentered R2 =    0.9585
  Residual SS             =  5583.253143              Root MSE      =      .825

------------------------------------------------------------------------------
lsales_vol~e | Coefficient  Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
      lprice |  -.9547462    .197882    -4.82   0.000    -1.342588   -.5669045

        firm |
          2 |   1.138973   .1421096     8.01   0.000     .8604436    1.417503
          3 |   .6380195   .1135982     5.62   0.000     .4153711    .8606678
          4 |   .3904996   .1044199     3.74   0.000     .1858403    .5951589
          6 |   .0550124   .0424484     1.30   0.195    -.0281848    .1382097
          7 |  -1.080327   .0471524   -22.91   0.000    -1.172744   -.9879098
          8 |  -.5764323   .0735522    -7.84   0.000     -.720592   -.4322726
          9 |  -.4901881   .0507518    -9.66   0.000    -.5896599   -.3907163

      carbo |   .0434215   .0054685     7.94   0.000     .0327034    .0541396
        fat |   .1774555   .0147694    12.02   0.000     .1485079     .206403
    protein |  -.1349585   .0775418    -1.74   0.082    -.2869376    .0170206
       flav |   .5362734   .0661188     8.11   0.000     .4066829    .6658638
      cream |  -.2728223   .0410166    -6.65   0.000    -.3532134   -.1924311
      drink |  -.0566745   .1150647    -0.49   0.622    -.2821971     .168848

      store |
          2 |  -1.496313   .0629866   -23.76   0.000    -1.619765   -1.372862
          3 |  -1.171845   .0586475   -19.98   0.000    -1.286792   -1.056898
          4 |  -1.490283   .0589302   -25.29   0.000    -1.605784   -1.374782
          5 |  -.1215937   .0659322    -1.84   0.065    -.2508185     .007631
          6 |  -1.053863   .0587442   -17.94   0.000    -1.168999    -.938726
          7 |  -.6326447   .0576798   -10.97   0.000     -.745695   -.5195944
          8 |  -.7142534   .0606621   -11.77   0.000    -.8331489   -.5953578
          9 |  -.7456073   .0606441   -12.29   0.000    -.8644675    -.626747
         10 |  -.2853587   .0596682    -4.78   0.000    -.4023062   -.1684113
         11 |  -.4866002   .0590139    -8.25   0.000    -.6022652   -.3709351
         12 |   .0063249   .0734618     0.09   0.931    -.1376576    .1503073
         13 |  -.3669706   .0595131    -6.17   0.000    -.4836142    -.250327
         14 |  -.2972426   .0586981    -5.06   0.000    -.4122888   -.1821964
         15 |  -.8566014   .0613493   -13.96   0.000    -.9768437    -.736359
         16 |  -.7749341   .0562195   -13.78   0.000    -.8851223   -.6647458
         17 |  -1.190697   .0585492   -20.34   0.000    -1.305451   -1.075942
         18 |   -1.10619   .0580139   -19.07   0.000    -1.219895    -.992485
         19 |  -1.050664   .0588148   -17.86   0.000    -1.165939   -.9353891
         20 |  -1.724339   .0581279   -29.66   0.000    -1.838267    -1.61041

      yweek |   .0439196   .0308224     1.42   0.154    -.0164912    .1043304
   periodo1 |   .4249717   .2845355     1.49   0.135    -.1327077    .9826512
```

```
       _cons |   4.348252   .6582595     6.61   0.000     3.058087    5.638417
------------------------------------------------------------------------------
Underidentification test (Anderson canon. corr. LM statistic):         495.241
                                                   Chi-sq(3) P-val =    0.0000
------------------------------------------------------------------------------
Weak identification test (Cragg-Donald Wald F statistic):              174.872
Stock-Yogo weak ID test critical values:  5% maximal IV relative bias    13.91
                                         10% maximal IV relative bias     9.08
                                         20% maximal IV relative bias     6.46
                                         30% maximal IV relative bias     5.39
                                         10% maximal IV size             22.30
                                         15% maximal IV size             12.83
                                         20% maximal IV size              9.54
                                         25% maximal IV size              7.80
Source: Stock-Yogo (2005).  Reproduced by permission.
------------------------------------------------------------------------------
Sargan statistic (overidentification test of all instruments):         211.628
                                                   Chi-sq(2) P-val =    0.0000
-endog- option:
Endogeneity test of endogenous regressors:                             104.004
                                                   Chi-sq(1) P-val =    0.0000
Regressors tested:   lprice
------------------------------------------------------------------------------
Instrumented:         lprice
Included instruments: 2.firm 3.firm 4.firm 6.firm 7.firm 8.firm 9.firm carbo
                      fat protein flav cream drink 2.store 3.store 4.store
                      5.store 6.store 7.store 8.store 9.store 10.store 11.store
                      12.store 13.store 14.store 15.store 16.store 17.store
                      18.store 19.store 20.store yweek periodo1
Excluded instruments: carbo1 protein1 fat1
------------------------------------------------------------------------------

183
184 esttab using _output/ivregfull.tex, title("Ivreg2 estimation with all instruments")
  > se keep(lprice) replace
  (output written to _output/ivregfull.tex)

185
186
187 //*****************************************************************************
188 //* n. Close log.
189 //*****************************************************************************
190
191 log close
       name:  <unnamed>
        log:  C:\Users\amcal\Documentos\Clases\3-Econometrics 2\_problem_sets\_ps2\_log
  > /log.smcl
   log type:  smcl
  closed on:  18 Mar 2022, 23:29:22
------------------------------------------------------------------------------
```