

Economics 312

Daily Problem #18

Spring 2020
February 27

This problem uses the pizza4.dta data set that was used in an earlier problem. Refer to that problem for the details of the data.

Our regression models pizza expenditures as a function of income and age. We want to test the composite hypothesis that all of the regression coefficients (including the constant) are the same for females as for males.

A regression for the full sample yields:

```
. reg pizza income age
```

Source	SS	df	MS			
Model	312015.179	2	156007.589	Number of obs =	40	
Residual	635636.721	37	17179.3708	F(2, 37) =	9.08	
Total	947651.9	39	24298.7667	Prob > F =	0.0006	
				R-squared =	0.3293	
				Adj R-squared =	0.2930	
				Root MSE =	131.07	

pizza	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
income	1.832479	.4643007	3.95	0.000	.8917163	2.773242
age	-7.575556	2.316988	-3.27	0.002	-12.27022	-2.880893
_cons	342.8848	72.34342	4.74	0.000	196.3031	489.4665

Separate regressions for the male and female sub-samples yield:

```
. reg pizza income age if female==0
```

Source	SS	df	MS			
Model	267771.904	2	133885.952	Number of obs =	19	
Residual	122227.886	16	7639.24285	F(2, 16) =	17.53	
Total	389999.789	18	21666.655	Prob > F =	0.0001	
				R-squared =	0.6866	
				Adj R-squared =	0.6474	
				Root MSE =	87.403	

pizza	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
income	2.748363	.5439122	5.05	0.000	1.595321	3.901406
age	-9.363168	1.974368	-4.74	0.000	-13.54864	-5.177694
_cons	451.3605	65.91154	6.85	0.000	311.6342	591.0867

```
. reg pizza income age if female==1
```

Source	SS	df	MS			
Model	98012.6286	2	49006.3143	Number of obs	=	21
Residual	122238.609	18	6791.03386	F(2, 18)	=	7.22
Total	220251.238	20	11012.5619	Prob > F	=	0.0050
				R-squared	=	0.4450
				Adj R-squared	=	0.3833
				Root MSE	=	82.408

pizza	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
income	1.38443	.3729702	3.71	0.002	.6008481	2.168011
age	-6.529422	2.352888	-2.78	0.012	-11.47266	-1.586188
_cons	243.0212	70.24771	3.46	0.003	95.43623	390.6061

Test the null hypothesis that all three regression coefficients are the same for females and males. This is a “Chow test” that can be performed using the F test formula in Wooldridge’s equation [4.37] if we have no heteroskedasticity or autocorrelation.

Hint: Note that running the regression on the full sample restricts the coefficients to be the same for males and females, while running separate regressions allows them to differ. When considering the SSR terms in equation [4.37], you must sum 40 squared residuals for each SSR.