


Lecture 5d: Practice Problem Solutions: John McGready



Lecture 5d: Practice Problem Solutions

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CE Charges

1. The following MLR relates total charges from the carotid endarterectomy procedures to the subject's race. To start, the race is coded as 0 for Caucasians, 1 for African Americans, and 2 for others in neither of the first two race categories. Here is the distribution of race in the sample of persons from 1995 in Maryland who had such a procedure.

```

. tab race
-----
Race | Freq.  Percent  Cum.
-----+-----
Caucas | 2,488  92.87  92.87
AfrAm  | 167    6.23  99.10
Other  | 24     0.90  100.00
Total  | 2,679  100.00

. tab race, nolab
-----
Race | Freq.  Percent  Cum.
-----+-----
0 | 2,488  92.87  92.87
1 | 167    6.23  99.10
2 | 24     0.90  100.00
Total  | 2,679  100.00
    
```

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CE Charges

1. Now, here is the MLR using the "xi" option in Stata. Caucasians are the reference group.

```

. xi: regress totchg i.race
      _Irace_0-2 (naturally coded; _Irace_0 omitted)
-----+-----
Source |      SS      df       MS              Number of obs = 2679
-----+-----
Model | 1.3918e+09    2    695906243          F( 2, 2676) = 25.91
Residual | 7.1861e+10  2676  26853776.6          Prob > F      = 0.0000
-----+-----
Total | 7.3253e+10  2678  27353442.4          R-squared     = 0.0190
                                          Adj R-squared = 0.0183
                                          Root MSE    = 5182.1

-----+-----
totchg |      Coef.   Std. Err.      t    P>|t|   [95% Conf. Interval]
-----+-----
_Irace_1 | 2934.388    414.2395     7.08  0.000   2122.127   3746.65
_Irace_2 | 1549.089    1062.874     1.46  0.145  -535.0484  3633.226
_cons | 6888.995    103.8909    66.31  0.000   6685.28   7092.709
    
```

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CE Charges

a) What does the overall F-test conclude about a population-level association between total CE charges and race (assume a significance level of 0.05)?

```

. xi: regress totchg i.race
      _Irace_0-2 (naturally coded; _Irace_0 omitted)
-----+-----
Source |      SS      df       MS              Number of obs = 2679
-----+-----
Model | 1.3918e+09    2    695906243          F( 2, 2676) = 25.91
Residual | 7.1861e+10  2676  26853776.6          Prob > F      = 0.0000
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Total | 7.3253e+10  2678  27353442.4          R-squared     = 0.0190
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_Irace_1 | 2934.388    414.2395     7.08  0.000   2122.127   3746.65
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_cons | 6888.995    103.8909    66.31  0.000   6685.28   7092.709
    
```

— The p-value from the F-test is very small (< .001): this leads to conclusions that at least one of the race group mean charges is statistically significantly different than at least one other race group.

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CE Charges

b) What is the estimated mean difference in CE charges for African-Americans compared to Caucasians?

```

. xi: regress totchg i.race
      _Irace_0-2 (naturally coded; _Irace_0 omitted)
-----+-----
Source |      SS      df       MS              Number of obs = 2679
-----+-----
Model | 1.3918e+09    2    695906243          F( 2, 2676) = 25.91
Residual | 7.1861e+10  2676  26853776.6          Prob > F      = 0.0000
-----+-----
Total | 7.3253e+10  2678  27353442.4          R-squared     = 0.0190
                                          Adj R-squared = 0.0183
                                          Root MSE    = 5182.1

-----+-----
totchg |      Coef.   Std. Err.      t    P>|t|   [95% Conf. Interval]
-----+-----
_Irace_1 | 2934.388    414.2395     7.08  0.000   2122.127   3746.65
_Irace_2 | 1549.089    1062.874     1.46  0.145  -535.0484  3633.226
_cons | 6888.995    103.8909    66.31  0.000   6685.28   7092.709
    
```

— With race coded 0 for Caucasians, this is the reference category as it is the lowest value of 0, 1, and 2. The coefficient for `_Irace_1` compares the mean charges for African Americans compared to the reference category.

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CE Charges

c) What is the estimated mean CE charges for African-Americans?

```

. xi: regress totchg i.race
      _Irace_0-2 (naturally coded; _Irace_0 omitted)
-----+-----
Source |      SS      df       MS              Number of obs = 2679
-----+-----
Model | 1.3918e+09    2    695906243          F( 2, 2676) = 25.91
Residual | 7.1861e+10  2676  26853776.6          Prob > F      = 0.0000
-----+-----
Total | 7.3253e+10  2678  27353442.4          R-squared     = 0.0190
                                          Adj R-squared = 0.0183
                                          Root MSE    = 5182.1

-----+-----
totchg |      Coef.   Std. Err.      t    P>|t|   [95% Conf. Interval]
-----+-----
_Irace_1 | 2934.388    414.2395     7.08  0.000   2122.127   3746.65
_Irace_2 | 1549.089    1062.874     1.46  0.145  -535.0484  3633.226
_cons | 6888.995    103.8909    66.31  0.000   6685.28   7092.709
    
```

— The estimated mean CE charges for African-Americans is as follows: \$6,889 + \$2,934 = \$9,823

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CE Charges

d) What is the estimated mean difference in CE charges for African-Americans compared to non-Caucasians/non-African Americans?

```
. xi: regress totchg i.race
      i.race
      _i.race_0=2 (naturally coded; _i.race_0 omitted)
```

Source	SS	df	MS	Number of obs = 2679		
Model	1.3918e+09	2	695906243	F(2, 2676)	=	25.91
Residual	7.1861e+10	2676	26853776.6	Prob > F	=	0.0000
Total	7.3253e+10	2678	27353442.4	R-squared	=	0.0190
				Adj R-squared	=	0.0183
				Root MSE	=	5182.1

totchg	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
_i.race_1	2934.388	414.2395	7.08	0.000	2122.127	3746.65
_i.race_2	-1549.399	1062.874	-1.46	0.145	-535.0494	3633.226
_cons	6888.335	103.4909	66.31	0.000	6685.28	7092.709

— This can be estimated by taking the slope for African Americans (_i.race_1) and subtracting the slope for other races (_i.race_2):
 $\$2,934 - \$1,549 = \$1,385$

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