Data Challenge #3

Questions

1) Do more civilians die when a particular government force is involved in heavy combat? Other analysis revealed that naval involvement is correlated with increased civilian death, so I'm curious if that is the case when long guns are involved or if another government force might be as well.

(We assume that involvement of long guns seized is indicative of heavy combat)

2) Are there no expected civilian deaths when the federal police is involved and no weapons are seized? Does a lack of weapons seized mean less violence?

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Call:
lm(formula = civilian_dead ~ civilian_wounded + afi * long_guns_seized +
    army * long_guns_seized + navy * long_guns_seized + federal_police *
    long_guns_seized + afi * cartridge_sezied + army * cartridge_sezied +
    navy * cartridge_sezied + federal_police * cartridge_sezied +
    small_arms_seized + clips_seized, data = AllData)

Residuals:
   Min     1Q Median     3Q    Max
-4.157 -0.083 -0.073 -0.017 49.975

Coefficients:
                                  Estimate Std. Error t value Pr(>|t|)
(Intercept)                      8.261e-02  1.609e-02   5.133 2.95e-07 ***
civilian_wounded                 2.429e-01  1.443e-02  16.830  < 2e-16 ***
afi                             -1.546e-03  2.424e-01  -0.006  0.99491
long_guns_seized                -1.325e-02  8.281e-03  -1.600  0.10965
army                            -6.916e-02  2.680e-02  -2.581  0.00989 **
navy                            -6.597e-02  7.541e-02  -0.875  0.38168
federal_police                  -6.770e-02  3.854e-02  -1.757  0.07905 .
cartridge_sezied                 4.453e-05  4.665e-05   0.955  0.33982
small_arms_seized                5.283e-03  8.933e-03   0.591  0.55428
clips_seized                    -4.583e-05  2.152e-04  -0.213  0.83138
afi:long_guns_seized             2.390e-02  3.770e-02   0.634  0.52616
long_guns_seized:army            1.715e-02  8.709e-03   1.969  0.04898 *
long_guns_seized:navy            7.487e-04  2.029e-02   0.037  0.97056
long_guns_seized:federal_police  4.525e-02  9.165e-03   4.938 8.15e-07 ***
afi:cartridge_sezied             1.107e-03  1.502e-03   0.737  0.46112
army:cartridge_sezied           -5.072e-05  4.721e-05  -1.074  0.28273
navy:cartridge_sezied           -2.304e-06  8.312e-05  -0.028  0.97789
federal_police:cartridge_sezied -1.480e-04  5.302e-05  -2.791  0.00528 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.8245 on 5377 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.05813,   Adjusted R-squared:  0.05515
F-statistic: 19.52 on 17 and 5377 DF,  p-value: < 2.2e-16
```

```
> beta
                  (Intercept)               civilian_wounded                           afi
                 8.261358e-02                  2.428554e-01                 -1.546373e-03
              long_guns_seized                           army                          navy
                 -1.325039e-02                 -6.916390e-02                 -6.597214e-02
                federal_police               cartridge_sezied              small_arms_seized
                 -6.769867e-02                  4.453465e-05                  5.283071e-03
                  clips_seized            afi:long_guns_seized           long_guns_seized:army
                 -4.582963e-05                  2.389981e-02                  1.715055e-02
         long_guns_seized:navy long_guns_seized:federal_police            afi:cartridge_sezied
                  7.487290e-04                  4.525178e-02                  1.106924e-03
         army:cartridge_sezied           navy:cartridge_sezied federal_police:cartridge_sezied
                 -5.072247e-05                 -2.303659e-06                 -1.479664e-04
```

```
> var
                  (Intercept)                civilian_wounded                             afi
                 2.590079e-04                    2.082337e-04                    5.877050e-02
            long_guns_seized                           army                            navy
                 6.857972e-05                    7.183186e-04                    5.686204e-03
              federal_police                 cartridge_sezied               small_arms_seized
                 1.485331e-03                    2.176457e-09                    7.980277e-05
                 clips_seized             afi:long_guns_seized           long_guns_seized:army
                 4.632127e-08                    1.421409e-03                    7.585000e-05
      long_guns_seized:navy long_guns_seized:federal_police            afi:cartridge_sezied
                 4.116668e-04                    8.399511e-05                    2.255421e-06
      army:cartridge_sezied           navy:cartridge_sezied federal_police:cartridge_sezied
                 2.229145e-09                    6.908935e-09                    2.811342e-09
>
```

5 seized long guns increase the expected number of dead in events that involve the federal police by 0.16 [0.07, 0.25]

0 seized long guns produce an expected number of dead in events that involve the federal police of -0.07 [-0.12, -0.02]

24 seized long guns increase the expected number of dead in events that involve the federal police by 1.02 [0.92, 1.12]

Conclusion

Both questions can be answered through the models highlighted above.

#1
The strongest interaction between long guns seized and the army in relationship to civilian deaths. However, if the amount of long guns seized is controlled to 5, the effect on deaths is insignificant.

In the initial coefficients, the interaction between the long guns seized and federal police stands out as the most significant (.045). However, .045 does not seem like that strong of an effect. The beta coefficient revealed that with every long gun and navy involvement, about .05 more civilians will be killed. This doesn't have much effect until about 24 long guns are seized, which would likely result in one more civilian death. Therefore, if this is the most significant interaction with law enforcement in heavy combat on civilian death, then there is not a strong interaction among any.

#2
When no long guns were seized, the marginal effect on the civilian deaths was very low, revealing that federal police events with no heavy combat do not significantly lower civilian deaths.

I wanted to better understand the marginal effect of long guns seized on civilian deaths during federal police events. My result was that .07% fewer civilians would die if no long guns are seized during the event. Obviously you can’t have negative numbers of long guns, so not finding any does not significantly affect civilian deaths.