**. glm dv `pp\_lag\_all\_vars' `covariates' ib(freq).state ib(freq).time if sample\_pp == 1, family(poisson) link(log) vce(cl mineid) exposure(hours) iter(50) eform**

Iteration 0: log pseudolikelihood = -5021.081

Iteration 1: log pseudolikelihood = -4706.5037

Iteration 2: log pseudolikelihood = -4704.9485

Iteration 3: log pseudolikelihood = -4704.9478

Iteration 4: log pseudolikelihood = -4704.9478

Generalized linear models No. of obs = 3,333

Optimization : ML Residual df = 3,304

Scale parameter = 1

Deviance = 4339.449241 (1/df) Deviance = 1.313393

Pearson = 4732.467228 (1/df) Pearson = 1.432345

Variance function: V(u) = u [Poisson]

Link function : g(u) = ln(u) [Log]

AIC = 2.840653

Log pseudolikelihood = -4704.947765 BIC = -22461.37

(Std. Err. adjusted for 727 clusters in mineid)

-----------------------------------------------------------------------------------

| Robust

dv | IRR Std. Err. z P>|z| [95% Conf. Interval]

------------------+----------------------------------------------------------------

p47\_pp\_c\_lag\_all | .9998945 .0001912 -0.55 0.581 .9995198 1.000269

p48\_pp\_c\_lag\_all | 1.000027 .0000189 1.45 0.148 .9999903 1.000064

p71\_pp\_c\_lag\_all | .9998351 .0001454 -1.13 0.257 .9995502 1.00012

p72\_pp\_c\_lag\_all | .9999907 .0000822 -0.11 0.910 .9998296 1.000152

p75\_pp\_c\_lag\_all | 1 2.07e-07 2.05 0.040 1 1.000001

p77\_pp\_c\_lag\_all | 1.000002 .0000119 0.14 0.888 .9999783 1.000025

mine\_time | .9801474 .0094039 -2.09 0.037 .9618883 .9987532

onsite\_insp\_hours | .9999184 .0000486 -1.68 0.093 .9998232 1.000014

|

state |

1 | 1.246177 .1722995 1.59 0.111 .9503657 1.634064

2 | 2.519762 .1968227 11.83 0.000 2.162075 2.936623

3 | .7217825 .1130006 -2.08 0.037 .5310607 .9809988

4 | 1.210459 .1059998 2.18 0.029 1.019554 1.437109

5 | .9305709 .1863717 -0.36 0.719 .6284542 1.377924

6 | 1.063738 .0760589 0.86 0.387 .9246398 1.223762

7 | 1.215646 .2238425 1.06 0.289 .8473668 1.743985

8 | .8033089 .0522791 -3.37 0.001 .7071095 .9125958

9 | .9045231 .1027292 -0.88 0.377 .724013 1.130038

10 | 1.06816 .1548976 0.45 0.649 .8038977 1.419293

11 | .8221667 .3713189 -0.43 0.665 .3392562 1.992471

12 | .8853801 .1028994 -1.05 0.295 .7050219 1.111877

13 | 1.18596 .2077555 0.97 0.330 .8413119 1.671794

14 | .6596672 .1357107 -2.02 0.043 .4407686 .9872772

15 | .6639201 .0788911 -3.45 0.001 .5259819 .8380324

17 | 1.010309 .0884672 0.12 0.907 .8509797 1.19947

|

time |

2007 | 1.094161 .0633216 1.55 0.120 .9768332 1.225582

2009 | .8723599 .0480353 -2.48 0.013 .7831149 .9717754

2010 | .8441512 .0558059 -2.56 0.010 .7415634 .9609309

2011 | .8823076 .0531147 -2.08 0.038 .7841116 .992801

2012 | .9040446 .0614198 -1.48 0.138 .7913346 1.032808

2013 | .8355273 .0649901 -2.31 0.021 .7173835 .9731279

2014 | .8170107 .065081 -2.54 0.011 .6989131 .9550635

2015 | .8225301 .0747959 -2.15 0.032 .6882539 .9830032

|

\_cons | .0000117 9.10e-07 -145.76 0.000 .00001 .0000136

ln(hours) | 1 (exposure)

-----------------------------------------------------------------------------------

**. estat gof**

Deviance goodness-of-fit = 4339.449

Prob > chi2(3304) = 0.0000

Pearson goodness-of-fit = 4732.467

Prob > chi2(3304) = 0.0000

**. glm dv `pp\_lag\_all\_vars' `covariates' ib(freq).state ib(freq).time if sample\_pp == 1, family(nbinomial) link(log) vce(cl mineid) exposure(hours) iter(50) eform**

Iteration 0: log pseudolikelihood = -4874.5588

Iteration 1: log pseudolikelihood = -4793.0218

Iteration 2: log pseudolikelihood = -4792.3685

Iteration 3: log pseudolikelihood = -4792.3684

Generalized linear models No. of obs = 3,333

Optimization : ML Residual df = 3,304

Scale parameter = 1

Deviance = 2011.959932 (1/df) Deviance = .6089467

Pearson = 2121.991732 (1/df) Pearson = .6422493

Variance function: V(u) = u+(1)u^2 [Neg. Binomial]

Link function : g(u) = ln(u) [Log]

AIC = 2.89311

Log pseudolikelihood = -4792.368409 BIC = -24788.86

(Std. Err. adjusted for 727 clusters in mineid)

-----------------------------------------------------------------------------------

| Robust

dv | IRR Std. Err. z P>|z| [95% Conf. Interval]

------------------+----------------------------------------------------------------

p47\_pp\_c\_lag\_all | .999962 .0002175 -0.17 0.861 .9995359 1.000388

p48\_pp\_c\_lag\_all | 1.000025 .0000228 1.11 0.267 .9999806 1.00007

p71\_pp\_c\_lag\_all | 1.000107 .0002236 0.48 0.633 .9996688 1.000545

p72\_pp\_c\_lag\_all | 1.000004 .0000844 0.05 0.962 .9998386 1.00017

p75\_pp\_c\_lag\_all | 1 2.29e-07 1.23 0.220 .9999998 1.000001

p77\_pp\_c\_lag\_all | 1.000001 .0000127 0.11 0.910 .9999766 1.000026

mine\_time | .9907232 .0081792 -1.13 0.259 .9748212 1.006885

onsite\_insp\_hours | .9999213 .0000441 -1.79 0.074 .9998349 1.000008

|

state |

1 | 1.201637 .1834757 1.20 0.229 .890851 1.620846

2 | 2.043112 .1358384 10.75 0.000 1.793491 2.327476

3 | .6604134 .1182669 -2.32 0.021 .4649247 .9381

4 | 1.146329 .101709 1.54 0.124 .9633537 1.364058

5 | .913675 .1801271 -0.46 0.647 .620842 1.344629

6 | .9400086 .0599535 -0.97 0.332 .8295498 1.065176

7 | 1.120446 .2108745 0.60 0.546 .7748008 1.620288

8 | .7399085 .0422349 -5.28 0.000 .6615921 .8274956

9 | .6988535 .1121386 -2.23 0.026 .510272 .9571292

10 | .7244379 .1357998 -1.72 0.085 .5016939 1.046077

11 | .9077014 .4963048 -0.18 0.859 .3108355 2.650668

12 | .8955377 .1211986 -0.82 0.415 .6868874 1.167568

13 | 1.203092 .2398343 0.93 0.354 .813979 1.778215

14 | .6511151 .1488503 -1.88 0.061 .4159739 1.019177

15 | .6515796 .0577734 -4.83 0.000 .5476389 .775248

17 | .9087987 .0887447 -0.98 0.327 .7504943 1.100495

|

time |

2007 | 1.114695 .0734929 1.65 0.100 .97957 1.268459

2009 | .8199963 .0535989 -3.04 0.002 .7213953 .9320742

2010 | .876566 .0639036 -1.81 0.071 .7598539 1.011205

2011 | .9133685 .0598404 -1.38 0.167 .8033014 1.038517

2012 | .9190474 .0675891 -1.15 0.251 .7956798 1.061543

2013 | .754989 .059588 -3.56 0.000 .6467836 .8812968

2014 | .7202432 .0605257 -3.91 0.000 .6108694 .8492

2015 | .7699359 .0665013 -3.03 0.002 .6500311 .9119583

|

\_cons | .0000118 9.20e-07 -145.27 0.000 .0000101 .0000137

ln(hours) | 1 (exposure)

-----------------------------------------------------------------------------------

**. nbreg dv `pp\_lag\_all\_vars' `covariates' ib(freq).state ib(freq).time if sample\_pp == 1, vce(cl mineid) exposure(hours) iter(50) irr**

Fitting Poisson model:

Iteration 0: log pseudolikelihood = -5435.5522

Iteration 1: log pseudolikelihood = -4718.3994

Iteration 2: log pseudolikelihood = -4705.0213

Iteration 3: log pseudolikelihood = -4704.9478

Iteration 4: log pseudolikelihood = -4704.9478

Fitting constant-only model:

Iteration 0: log pseudolikelihood = -4833.1956

Iteration 1: log pseudolikelihood = -4642.8135

Iteration 2: log pseudolikelihood = -4639.576

Iteration 3: log pseudolikelihood = -4639.57

Iteration 4: log pseudolikelihood = -4639.57

Fitting full model:

Iteration 0: log pseudolikelihood = -4570.1191

Iteration 1: log pseudolikelihood = -4559.4546

Iteration 2: log pseudolikelihood = -4559.3668

Iteration 3: log pseudolikelihood = -4559.3668

Negative binomial regression Number of obs = 3,333

Wald chi2(28) = .

Dispersion = mean Prob > chi2 = .

Log pseudolikelihood = -4559.3668 Pseudo R2 = 0.0173

(Std. Err. adjusted for 727 clusters in mineid)

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| Robust

dv | IRR Std. Err. z P>|z| [95% Conf. Interval]

------------------+----------------------------------------------------------------

p47\_pp\_c\_lag\_all | .9999231 .0002041 -0.38 0.707 .9995231 1.000323

p48\_pp\_c\_lag\_all | 1.000024 .0000198 1.20 0.231 .9999849 1.000063

p71\_pp\_c\_lag\_all | .9999484 .0001734 -0.30 0.766 .9996086 1.000288

p72\_pp\_c\_lag\_all | .9999927 .0000778 -0.09 0.925 .9998403 1.000145

p75\_pp\_c\_lag\_all | 1 2.27e-07 1.82 0.069 1 1.000001

p77\_pp\_c\_lag\_all | 1 .0000124 0.04 0.969 .9999763 1.000025

mine\_time | .9850502 .0084964 -1.75 0.081 .9685375 1.001844

onsite\_insp\_hours | .9999137 .0000439 -1.97 0.049 .9998276 .9999997

|

state |

1 | 1.212976 .171867 1.36 0.173 .9188515 1.601251

2 | 2.281742 .1568303 12.00 0.000 1.994165 2.61079

3 | .687534 .1131023 -2.28 0.023 .4980442 .9491186

4 | 1.161243 .0985126 1.76 0.078 .9833596 1.371304

5 | .9199931 .1841286 -0.42 0.677 .6214754 1.3619

6 | .9865881 .0631736 -0.21 0.833 .8702248 1.118511

7 | 1.164525 .2184928 0.81 0.417 .8062005 1.682111

8 | .7735533 .045624 -4.35 0.000 .6891068 .8683482

9 | .8113041 .1035437 -1.64 0.101 .6317539 1.041884

10 | .8698976 .145427 -0.83 0.404 .6268544 1.207173

11 | .8322122 .3923349 -0.39 0.697 .3303292 2.096627

12 | .8884034 .1106196 -0.95 0.342 .6960218 1.13396

13 | 1.179068 .2068107 0.94 0.348 .8360583 1.662805

14 | .6411626 .1383901 -2.06 0.039 .4199937 .9787991

15 | .6649435 .0631191 -4.30 0.000 .5520588 .8009109

17 | .9677312 .086938 -0.37 0.715 .8114941 1.154049

|

time |

2007 | 1.102708 .0667334 1.62 0.106 .9793725 1.241576

2009 | .8491456 .0504529 -2.75 0.006 .7558004 .9540194

2010 | .853717 .0568439 -2.38 0.018 .7492686 .9727256

2011 | .89584 .0541652 -1.82 0.069 .7957273 1.008548

2012 | .9029045 .060303 -1.53 0.126 .7921217 1.029181

2013 | .784062 .0580238 -3.29 0.001 .6782003 .906448

2014 | .7570446 .0594293 -3.55 0.000 .6490837 .8829624

2015 | .7825467 .0648058 -2.96 0.003 .6653021 .9204529

|

\_cons | .000012 8.97e-07 -151.24 0.000 .0000103 .0000139

ln(hours) | 1 (exposure)

------------------+----------------------------------------------------------------

/lnalpha | -1.592077 .1201257 -1.827519 -1.356635

------------------+----------------------------------------------------------------

alpha | .2035025 .0244459 .160812 .2575259

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(est1 stored)

**. lrtest pois nbin, stats force**

Likelihood-ratio test LR chi2(1) = 291.16

(Assumption: pois nested in nbin) Prob > chi2 = 0.0000

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------

Model | Obs ll(null) ll(model) df AIC BIC

-------------+---------------------------------------------------------------

pois | 3,333 -4869.058 -4704.948 29 9467.896 9645.133

nbin | 3,333 -4639.57 -4559.367 30 9178.734 9362.082

-----------------------------------------------------------------------------

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

**. summ dv cpp4\_yhat**

Variable | Obs Mean Std. Dev. Min Max

-------------+---------------------------------------------------------

dv | 6,253 1.881017 3.268911 0 37

cpp4\_yhat | 6,253 1.671122 2.447471 .0006652 22.40597