**. glm dv `pp\_lag\_1\_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 = -5002.7035

Iteration 1: log pseudolikelihood = -4694.2792

Iteration 2: log pseudolikelihood = -4692.7935

Iteration 3: log pseudolikelihood = -4692.7929

Iteration 4: log pseudolikelihood = -4692.7929

Generalized linear models No. of obs = 3,333

Optimization : ML Residual df = 3,304

Scale parameter = 1

Deviance = 4315.139473 (1/df) Deviance = 1.306035

Pearson = 4680.883746 (1/df) Pearson = 1.416732

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

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

AIC = 2.833359

Log pseudolikelihood = -4692.792881 BIC = -22485.68

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

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

| Robust

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

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

p47\_pp\_1lag | .9980462 .0008584 -2.27 0.023 .9963652 .99973

p48\_pp\_1lag | 1.000183 .0001333 1.37 0.170 .9999215 1.000444

p71\_pp\_1lag | .9994614 .0008588 -0.63 0.531 .9977797 1.001146

p72\_pp\_1lag | .9994599 .0005358 -1.01 0.314 .9984103 1.000511

p75\_pp\_1lag | 1.000014 4.03e-06 3.50 0.000 1.000006 1.000022

p77\_pp\_1lag | .9999662 .0001027 -0.33 0.742 .9997649 1.000167

mine\_time | .986861 .0093156 -1.40 0.161 .9687706 1.005289

onsite\_insp\_hours | .9998664 .0000616 -2.17 0.030 .9997456 .9999873

|

state |

1 | 1.378541 .1866512 2.37 0.018 1.057229 1.797506

2 | 2.437704 .1893869 11.47 0.000 2.093392 2.838647

3 | .7570284 .1101709 -1.91 0.056 .5691624 1.006904

4 | 1.210788 .1166498 1.99 0.047 1.002447 1.462428

5 | .9858153 .198223 -0.07 0.943 .664722 1.462012

6 | 1.095918 .0771577 1.30 0.193 .9546615 1.258075

7 | 1.207693 .2351053 0.97 0.332 .8246138 1.768734

8 | .8219657 .0512443 -3.14 0.002 .7274224 .9287968

9 | .8765832 .0679879 -1.70 0.089 .7529633 1.020499

10 | 1.093864 .1627872 0.60 0.547 .8171258 1.464327

11 | .8214094 .3752767 -0.43 0.667 .3354841 2.011164

12 | .940873 .119067 -0.48 0.630 .7341957 1.20573

13 | 1.244913 .2155641 1.27 0.206 .8866421 1.747952

14 | .6798446 .1393528 -1.88 0.060 .4549175 1.015984

15 | .689022 .0739304 -3.47 0.001 .5583433 .8502858

17 | 1.100326 .0629159 1.67 0.095 .9836715 1.230814

|

time |

2007 | 1.161877 .0710229 2.45 0.014 1.03069 1.309761

2009 | .9001376 .0493004 -1.92 0.055 .8085161 1.002142

2010 | .899929 .056237 -1.69 0.092 .7961891 1.017186

2011 | .9519593 .0558696 -0.84 0.402 .8485201 1.068008

2012 | .9903884 .064366 -0.15 0.882 .8719375 1.12493

2013 | .9288108 .0739554 -0.93 0.354 .7946052 1.085683

2014 | .9204431 .0758414 -1.01 0.314 .7831785 1.081765

2015 | .9375506 .0854767 -0.71 0.479 .7841343 1.120983

|

\_cons | .0000102 7.85e-07 -149.57 0.000 8.78e-06 .0000119

ln(hours) | 1 (exposure)

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

**. estat gof**

Deviance goodness-of-fit = 4315.139

Prob > chi2(3304) = 0.0000

Pearson goodness-of-fit = 4680.884

Prob > chi2(3304) = 0.0000

**. glm dv `pp\_lag\_1\_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 = -4865.681

Iteration 1: log pseudolikelihood = -4788.2262

Iteration 2: log pseudolikelihood = -4787.656

Iteration 3: log pseudolikelihood = -4787.656

Generalized linear models No. of obs = 3,333

Optimization : ML Residual df = 3,304

Scale parameter = 1

Deviance = 2002.535071 (1/df) Deviance = .6060941

Pearson = 2125.264431 (1/df) Pearson = .6432398

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

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

AIC = 2.890283

Log pseudolikelihood = -4787.655979 BIC = -24798.28

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

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

| Robust

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

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

p47\_pp\_1lag | .9988485 .0009767 -1.18 0.239 .9969361 1.000765

p48\_pp\_1lag | 1.000204 .0001735 1.17 0.240 .9998637 1.000544

p71\_pp\_1lag | 1.000602 .0010514 0.57 0.567 .9985431 1.002665

p72\_pp\_1lag | .9995124 .0006329 -0.77 0.441 .9982727 1.000754

p75\_pp\_1lag | 1.000018 4.68e-06 3.87 0.000 1.000009 1.000027

p77\_pp\_1lag | 1.00002 .0001156 0.17 0.862 .9997936 1.000247

mine\_time | .9927243 .0075118 -0.97 0.335 .97811 1.007557

onsite\_insp\_hours | .9998414 .000054 -2.94 0.003 .9997355 .9999473

|

state |

1 | 1.296408 .188936 1.78 0.075 .9742924 1.72502

2 | 1.994894 .1305546 10.55 0.000 1.754743 2.267912

3 | .6943897 .1156516 -2.19 0.029 .5009962 .9624365

4 | 1.157996 .1060363 1.60 0.109 .9677506 1.38564

5 | .9598076 .1926743 -0.20 0.838 .6476073 1.422514

6 | .9677811 .0613133 -0.52 0.605 .8547708 1.095733

7 | 1.108105 .2173145 0.52 0.601 .7544819 1.627471

8 | .7784528 .0476614 -4.09 0.000 .6904254 .8777034

9 | .7859506 .0581376 -3.26 0.001 .6798779 .9085724

10 | .7436821 .1420415 -1.55 0.121 .5114578 1.081346

11 | .9074141 .5052902 -0.17 0.861 .3046611 2.702676

12 | .9798147 .130557 -0.15 0.878 .7546129 1.272224

13 | 1.226725 .2359922 1.06 0.288 .8413888 1.788537

14 | .6868914 .1491211 -1.73 0.084 .4488446 1.051187

15 | .6600171 .0576125 -4.76 0.000 .5562298 .78317

17 | 1.027075 .0579733 0.47 0.636 .9195095 1.147225

|

time |

2007 | 1.171805 .0802427 2.32 0.021 1.024629 1.34012

2009 | .8209278 .0547993 -2.96 0.003 .7202525 .9356754

2010 | .9012568 .0656657 -1.43 0.154 .7813218 1.039602

2011 | .9565113 .0634425 -0.67 0.503 .8399095 1.089301

2012 | .9692538 .0708663 -0.43 0.669 .8398514 1.118594

2013 | .8091389 .0638494 -2.68 0.007 .6931936 .9444775

2014 | .7803208 .0647502 -2.99 0.003 .6631952 .9181317

2015 | .847514 .0714956 -1.96 0.050 .7183568 .999893

|

\_cons | .0000108 7.94e-07 -154.97 0.000 9.30e-06 .0000124

ln(hours) | 1 (exposure)

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

**. nbreg dv `pp\_lag\_1\_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 = -4896.1686

Iteration 1: log pseudolikelihood = -4695.7239

Iteration 2: log pseudolikelihood = -4692.8024

Iteration 3: log pseudolikelihood = -4692.7929

Iteration 4: log pseudolikelihood = -4692.7929

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 = -4562.2836

Iteration 1: log pseudolikelihood = -4550.6481

Iteration 2: log pseudolikelihood = -4550.5405

Iteration 3: log pseudolikelihood = -4550.5405

Negative binomial regression Number of obs = 3,333

Wald chi2(28) = .

Dispersion = mean Prob > chi2 = .

Log pseudolikelihood = -4550.5405 Pseudo R2 = 0.0192

(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\_1lag | .9984873 .0008895 -1.70 0.089 .9967454 1.000232

p48\_pp\_1lag | 1.000176 .0001455 1.21 0.228 .9998904 1.000461

p71\_pp\_1lag | .9999195 .0008804 -0.09 0.927 .9981953 1.001647

p72\_pp\_1lag | .9994537 .0005474 -1.00 0.318 .9983815 1.000527

p75\_pp\_1lag | 1.000016 4.40e-06 3.68 0.000 1.000008 1.000025

p77\_pp\_1lag | .9999753 .0001123 -0.22 0.826 .9997552 1.000196

mine\_time | .9893535 .0078885 -1.34 0.179 .9740125 1.004936

onsite\_insp\_hours | .9998537 .0000561 -2.61 0.009 .9997437 .9999637

|

state |

1 | 1.334016 .184623 2.08 0.037 1.017086 1.749703

2 | 2.231607 .1503609 11.91 0.000 1.955535 2.546654

3 | .7224411 .1095546 -2.14 0.032 .5366881 .9724851

4 | 1.173211 .1038206 1.81 0.071 .9863953 1.395408

5 | .9719804 .195801 -0.14 0.888 .6549178 1.442541

6 | 1.017945 .0643423 0.28 0.778 .8993349 1.152198

7 | 1.157201 .2279944 0.74 0.459 .7865082 1.702607

8 | .8072231 .0482984 -3.58 0.000 .7178999 .9076603

9 | .8318804 .0591274 -2.59 0.010 .7237027 .9562283

10 | .8949785 .1526737 -0.65 0.515 .6406292 1.250312

11 | .8326002 .3973506 -0.38 0.701 .3267447 2.121604

12 | .9643836 .1202552 -0.29 0.771 .7552801 1.231379

13 | 1.226038 .2088402 1.20 0.232 .8780358 1.711967

14 | .670838 .1409041 -1.90 0.057 .4444569 1.012525

15 | .6805778 .0613066 -4.27 0.000 .5704287 .8119965

17 | 1.06186 .0579691 1.10 0.272 .9541103 1.181779

|

time |

2007 | 1.161675 .0733286 2.37 0.018 1.026489 1.314666

2009 | .8586392 .052074 -2.51 0.012 .7624087 .9670159

2010 | .8864286 .0580767 -1.84 0.066 .7796059 1.007888

2011 | .9478396 .0572934 -0.89 0.375 .8419434 1.067055

2012 | .9634425 .062685 -0.57 0.567 .8480933 1.09448

2013 | .8511617 .0637014 -2.15 0.031 .7350343 .9856358

2014 | .8306834 .0645755 -2.39 0.017 .7132881 .9674001

2015 | .8740898 .0701038 -1.68 0.093 .7469438 1.022879

|

\_cons | .0000107 7.64e-07 -160.53 0.000 9.31e-06 .0000123

ln(hours) | 1 (exposure)

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

/lnalpha | -1.607682 .1202934 -1.843452 -1.371911

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

alpha | .2003516 .024101 .1582701 .2536219

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(est1 stored)

**. lrtest pois nbin, stats force**

Likelihood-ratio test LR chi2(1) = 284.50

(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 -4692.793 29 9443.586 9620.823

nbin | 3,333 -4639.57 -4550.541 30 9161.081 9344.43

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

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

**. summ dv cpp2\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

dv | 6,253 1.881017 3.268911 0 37

cpp2\_yhat | 6,253 1.60967 2.398749 .0006487 30.17433