**. glm MR `part\_sigandsub\_lag\_all\_vars' `covariates' ib(freq).state ib(freq).time, family(poisson) link(log) vce(cl mineid) exposure(hours) iter(50) eform**

Iteration 0: log pseudolikelihood = -9593.1526

Iteration 1: log pseudolikelihood = -9002.9251

Iteration 2: log pseudolikelihood = -8999.6297

Iteration 3: log pseudolikelihood = -8999.6274

Iteration 4: log pseudolikelihood = -8999.6274

Generalized linear models No. of obs = 6,253

Optimization : ML Residual df = 6,217

Scale parameter = 1

Deviance = 8424.389029 (1/df) Deviance = 1.355057

Pearson = 9319.950141 (1/df) Pearson = 1.499107

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

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

AIC = 2.890014

Log pseudolikelihood = -8999.627361 BIC = -45917.27

(Std. Err. adjusted for 1,238 clusters in mineid)

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| Robust

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

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

p47\_ss\_c\_lag\_all | .9682217 .0263726 -1.19 0.236 .9178879 1.021316

p48\_ss\_c\_lag\_all | 1.003758 .0038307 0.98 0.326 .9962779 1.011294

p71\_ss\_c\_lag\_all | .9751756 .0216839 -1.13 0.258 .9335888 1.018615

p72\_ss\_c\_lag\_all | 1.006506 .0127133 0.51 0.608 .9818939 1.031734

p75\_ss\_c\_lag\_all | 1.000017 .0000438 0.39 0.698 .9999311 1.000103

p77\_ss\_c\_lag\_all | 1.00145 .0015465 0.94 0.348 .9984239 1.004486

mine\_time | .9885552 .0087283 -1.30 0.192 .9715952 1.005811

onsite\_insp\_hours | .9999274 .0000513 -1.42 0.157 .9998268 1.000028

|

state |

1 | 1.086226 .0870752 1.03 0.302 .9282937 1.271028

2 | 2.164473 .1328406 12.58 0.000 1.91916 2.441142

3 | .6972195 .1213848 -2.07 0.038 .4956519 .980759

4 | 1.219996 .1093708 2.22 0.027 1.02341 1.454345

5 | .9339191 .1447251 -0.44 0.659 .6892909 1.265365

6 | 1.046096 .0637708 0.74 0.460 .9282859 1.178858

7 | 1.032335 .2273806 0.14 0.885 .6704034 1.589663

8 | .909627 .0504709 -1.71 0.088 .8158949 1.014127

9 | .7652447 .0428375 -4.78 0.000 .6857268 .8539837

10 | 1.125549 .1851355 0.72 0.472 .8153706 1.553725

11 | .8965117 .2235175 -0.44 0.661 .5499651 1.461426

12 | .9408007 .0851212 -0.67 0.500 .7879219 1.123342

13 | 1.32284 .195526 1.89 0.058 .990132 1.767346

14 | .6253372 .0853518 -3.44 0.001 .4785578 .8171357

15 | .6723568 .0688439 -3.88 0.000 .5501026 .8217808

17 | .9947656 .082285 -0.06 0.949 .8458845 1.169851

|

time |

2000 | 1.106693 .0662106 1.69 0.090 .9842417 1.244378

2002 | 1.004709 .0553669 0.09 0.932 .9018471 1.119304

2003 | .8851613 .0528897 -2.04 0.041 .7873391 .9951372

2004 | .9129831 .0575296 -1.44 0.149 .806912 1.032998

2005 | .8067121 .048989 -3.54 0.000 .7161893 .9086765

2006 | .77245 .054888 -3.63 0.000 .6720267 .8878799

2007 | .7368769 .0533359 -4.22 0.000 .639417 .8491917

2008 | .6786793 .0515875 -5.10 0.000 .5847408 .7877089

2009 | .5953409 .0489045 -6.31 0.000 .506808 .6993394

2010 | .579642 .0522478 -6.05 0.000 .4857739 .6916487

2011 | .6112457 .0528038 -5.70 0.000 .5160394 .7240169

2012 | .629893 .0538657 -5.40 0.000 .5326915 .7448312

2013 | .5846042 .0588257 -5.33 0.000 .4799653 .7120557

2014 | .5785983 .0602625 -5.25 0.000 .4717613 .70963

2015 | .5874605 .070196 -4.45 0.000 .4648022 .7424876

|

\_cons | .0000163 1.01e-06 -177.76 0.000 .0000144 .0000184

ln(hours) | 1 (exposure)

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

**. estat gof**

Deviance goodness-of-fit = 8424.389

Prob > chi2(6217) = 0.0000

Pearson goodness-of-fit = 9319.95

Prob > chi2(6217) = 0.0000

**. glm MR `part\_sigandsub\_lag\_all\_vars' `covariates' ib(freq).state ib(freq).time, family(nbinomial) link(log) vce(cl mineid) exposure(hours) iter(50) eform**

Iteration 0: log pseudolikelihood = -9229.1491

Iteration 1: log pseudolikelihood = -9098.2743

Iteration 2: log pseudolikelihood = -9097.0624

Iteration 3: log pseudolikelihood = -9097.0622

Generalized linear models No. of obs = 6,253

Optimization : ML Residual df = 6,217

Scale parameter = 1

Deviance = 3880.361958 (1/df) Deviance = .6241534

Pearson = 4159.641645 (1/df) Pearson = .6690754

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

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

AIC = 2.921178

Log pseudolikelihood = -9097.062154 BIC = -50461.3

(Std. Err. adjusted for 1,238 clusters in mineid)

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| Robust

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

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

p47\_ss\_c\_lag\_all | .9991251 .0429527 -0.02 0.984 .9183885 1.086959

p48\_ss\_c\_lag\_all | 1.004553 .0041907 1.09 0.276 .9963723 1.0128

p71\_ss\_c\_lag\_all | .9895225 .0237499 -0.44 0.661 .9440514 1.037184

p72\_ss\_c\_lag\_all | .9867865 .0113188 -1.16 0.246 .9648496 1.009222

p75\_ss\_c\_lag\_all | 1.00001 .0000417 0.25 0.805 .9999286 1.000092

p77\_ss\_c\_lag\_all | 1.001766 .0017952 0.98 0.325 .9982534 1.00529

mine\_time | .9939105 .0079285 -0.77 0.444 .9784917 1.009572

onsite\_insp\_hours | .9999551 .0000415 -1.08 0.279 .9998738 1.000036

|

state |

1 | .9977555 .1085804 -0.02 0.984 .8061064 1.234968

2 | 1.713656 .0913754 10.10 0.000 1.543604 1.902441

3 | .7174247 .1346877 -1.77 0.077 .4965622 1.036523

4 | 1.077023 .0825 0.97 0.333 .9268786 1.251489

5 | .8493188 .1425011 -0.97 0.330 .611299 1.180016

6 | .8829813 .0446099 -2.46 0.014 .7997371 .9748904

7 | .9347814 .2104761 -0.30 0.765 .601247 1.45334

8 | 1.057142 .043778 1.34 0.180 .9747287 1.146524

9 | .7363145 .0390793 -5.77 0.000 .6635696 .8170341

10 | .7839583 .1338077 -1.43 0.154 .5610584 1.095413

11 | .8733972 .2273967 -0.52 0.603 .524317 1.454888

12 | .9425069 .0841041 -0.66 0.507 .791276 1.122641

13 | 1.322159 .2137746 1.73 0.084 .9630665 1.815144

14 | .6264254 .0968357 -3.03 0.002 .4626865 .8481095

15 | .6559858 .0450104 -6.14 0.000 .5734418 .7504117

17 | .9401458 .0655343 -0.89 0.376 .8200889 1.077778

|

time |

2000 | 1.056842 .0699794 0.83 0.404 .9282125 1.203298

2002 | .9363354 .0627552 -0.98 0.326 .8210736 1.067778

2003 | .8694833 .06565 -1.85 0.064 .7498796 1.008163

2004 | .8361718 .0598448 -2.50 0.012 .7267332 .9620908

2005 | .7356131 .0518509 -4.36 0.000 .6406948 .8445936

2006 | .7586367 .0576024 -3.64 0.000 .653737 .8803687

2007 | .7007853 .0540001 -4.61 0.000 .6025516 .8150339

2008 | .6277911 .0476318 -6.14 0.000 .5410442 .7284463

2009 | .5145048 .0429535 -7.96 0.000 .4368444 .6059714

2010 | .5507661 .0472319 -6.96 0.000 .4655549 .6515736

2011 | .5784134 .0485018 -6.53 0.000 .4907524 .681733

2012 | .5830836 .0514899 -6.11 0.000 .4904158 .6932616

2013 | .4797797 .0455759 -7.73 0.000 .3982753 .5779635

2014 | .4604062 .0461331 -7.74 0.000 .378312 .560315

2015 | .495888 .0516278 -6.74 0.000 .4043556 .6081401

|

\_cons | .0000183 1.22e-06 -163.90 0.000 .000016 .0000208

ln(hours) | 1 (exposure)

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

**. nbreg MR `part\_sigandsub\_lag\_all\_vars' `covariates' ib(freq).state ib(freq).time, vce(cl mineid) exposure(hours) iter(50) irr**

Fitting Poisson model:

Iteration 0: log pseudolikelihood = -9875.5345

Iteration 1: log pseudolikelihood = -9012.3275

Iteration 2: log pseudolikelihood = -8999.6356

Iteration 3: log pseudolikelihood = -8999.6274

Iteration 4: log pseudolikelihood = -8999.6274

Fitting constant-only model:

Iteration 0: log pseudolikelihood = -9249.9658

Iteration 1: log pseudolikelihood = -8971.6355

Iteration 2: log pseudolikelihood = -8961.958

Iteration 3: log pseudolikelihood = -8961.9317

Iteration 4: log pseudolikelihood = -8961.9317

Fitting full model:

Iteration 0: log pseudolikelihood = -8721.4541

Iteration 1: log pseudolikelihood = -8686.9716

Iteration 2: log pseudolikelihood = -8686.3457

Iteration 3: log pseudolikelihood = -8686.3455

Negative binomial regression Number of obs = 6,253

Wald chi2(35) = .

Dispersion = mean Prob > chi2 = .

Log pseudolikelihood = -8686.3455 Pseudo R2 = 0.0308

(Std. Err. adjusted for 1,238 clusters in mineid)

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| Robust

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

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

p47\_ss\_c\_lag\_all | .9857454 .0369769 -0.38 0.702 .9158721 1.060949

p48\_ss\_c\_lag\_all | 1.004444 .0040224 1.11 0.268 .9965908 1.012358

p71\_ss\_c\_lag\_all | .9840016 .0239586 -0.66 0.508 .9381465 1.032098

p72\_ss\_c\_lag\_all | .9954778 .0117887 -0.38 0.702 .9726385 1.018853

p75\_ss\_c\_lag\_all | 1.000018 .0000425 0.43 0.668 .9999349 1.000102

p77\_ss\_c\_lag\_all | 1.001357 .0016863 0.81 0.421 .9980578 1.004668

mine\_time | .9909813 .0079698 -1.13 0.260 .9754832 1.006726

onsite\_insp\_hours | .9999356 .0000436 -1.48 0.140 .9998501 1.000021

|

state |

1 | 1.02258 .092585 0.25 0.805 .8563058 1.22114

2 | 1.931064 .1068812 11.89 0.000 1.732543 2.152332

3 | .7010605 .1320625 -1.89 0.059 .4846298 1.014147

4 | 1.110518 .0850714 1.37 0.171 .9556948 1.290423

5 | .8836614 .1427595 -0.77 0.444 .6438288 1.212834

6 | .9388927 .0495093 -1.20 0.232 .8467023 1.041121

7 | .9760654 .2184556 -0.11 0.914 .6294618 1.513521

8 | .9459949 .0457349 -1.15 0.251 .860472 1.040018

9 | .7432362 .039449 -5.59 0.000 .6698033 .8247197

10 | .9079402 .1456152 -0.60 0.547 .6630432 1.243291

11 | .8627273 .2060407 -0.62 0.536 .5402385 1.377722

12 | .9370492 .0822789 -0.74 0.459 .7888992 1.113021

13 | 1.290634 .195313 1.69 0.092 .959378 1.736266

14 | .61143 .0896093 -3.36 0.001 .4587724 .8148848

15 | .6636115 .0514838 -5.29 0.000 .5700023 .7725938

17 | .9520689 .0706214 -0.66 0.508 .8232448 1.101052

|

time |

2000 | 1.089488 .065293 1.43 0.153 .968746 1.225279

2002 | .9815559 .0587703 -0.31 0.756 .8728702 1.103775

2003 | .8759204 .0561797 -2.07 0.039 .77245 .9932507

2004 | .8841706 .0575714 -1.89 0.059 .7782363 1.004525

2005 | .7776275 .0491552 -3.98 0.000 .6870141 .8801924

2006 | .7807098 .0544962 -3.55 0.000 .6808835 .8951718

2007 | .7269181 .0523885 -4.43 0.000 .6311607 .8372035

2008 | .6594025 .0469269 -5.85 0.000 .5735538 .758101

2009 | .5612717 .043647 -7.43 0.000 .4819255 .6536817

2010 | .5674271 .0456262 -7.05 0.000 .484692 .6642847

2011 | .5988446 .0476577 -6.44 0.000 .5123575 .6999308

2012 | .6053212 .0491935 -6.18 0.000 .5161906 .7098419

2013 | .5265903 .0483791 -6.98 0.000 .4398159 .630485

2014 | .5122116 .0490451 -6.99 0.000 .4245662 .61795

2015 | .5358617 .0551745 -6.06 0.000 .4379349 .6556859

|

\_cons | .0000175 1.08e-06 -178.05 0.000 .0000155 .0000197

ln(hours) | 1 (exposure)

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

/lnalpha | -1.507912 .0949908 -1.694091 -1.321733

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

alpha | .2213717 .0210283 .1837663 .2666726

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

**. lrtest pois nbin, stats force**

Likelihood-ratio test LR chi2(1) = 626.56

(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 | 6,253 -9569.622 -8999.627 36 18071.25 18313.92

nbin | 6,253 -8961.932 -8686.346 37 17446.69 17696.1

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

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

**. summ MR pcssv4\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

MR | 6,253 1.881017 3.268911 0 37

pcssv4\_yhat | 6,253 1.914518 2.818447 .0006567 23.66237