**. glm MR `part\_sigandsub\_lag\_4\_vars' `covariates' ib(freq).state ib(freq).time, family(poisson) link(log) vce(cl mineid) exposure(hours) iter(50) eform**

Iteration 0: log pseudolikelihood = -9588.7197

Iteration 1: log pseudolikelihood = -8986.9135

Iteration 2: log pseudolikelihood = -8983.3955

Iteration 3: log pseudolikelihood = -8983.393

Iteration 4: log pseudolikelihood = -8983.393

Generalized linear models No. of obs = 6,253

Optimization : ML Residual df = 6,217

Scale parameter = 1

Deviance = 8391.920366 (1/df) Deviance = 1.349834

Pearson = 9323.279011 (1/df) Pearson = 1.499643

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

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

AIC = 2.884821

Log pseudolikelihood = -8983.39303 BIC = -45949.74

(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\_4lag | .9150463 .0838307 -0.97 0.333 .7646477 1.095027

p48\_ss\_c\_4lag | 1.004538 .0087524 0.52 0.603 .9875294 1.02184

p71\_ss\_c\_4lag | .916021 .0442414 -1.82 0.069 .833287 1.006969

p72\_ss\_c\_4lag | .9914221 .0206539 -0.41 0.679 .9517566 1.032741

p75\_ss\_c\_4lag | 1.000575 .0002257 2.55 0.011 1.000133 1.001017

p77\_ss\_c\_4lag | 1.004224 .0062539 0.68 0.499 .9920408 1.016556

mine\_time | .9924027 .0089602 -0.84 0.398 .9749956 1.010121

onsite\_insp\_hours | .999892 .0000523 -2.06 0.039 .9997895 .9999946

|

state |

1 | 1.091587 .0882949 1.08 0.279 .9315526 1.279114

2 | 2.056478 .1412355 10.50 0.000 1.797484 2.35279

3 | .7429069 .1204195 -1.83 0.067 .5407061 1.020722

4 | 1.258786 .1274097 2.27 0.023 1.032277 1.534996

5 | .9730374 .149123 -0.18 0.858 .7205739 1.313955

6 | 1.063133 .0648266 1.00 0.315 .943374 1.198095

7 | 1.021255 .2315319 0.09 0.926 .6548706 1.592622

8 | .9101858 .043578 -1.97 0.049 .8286594 .999733

9 | .8056824 .0396411 -4.39 0.000 .7316158 .8872472

10 | 1.181137 .1540689 1.28 0.202 .9146789 1.525219

11 | .8996386 .2378845 -0.40 0.689 .5357861 1.510583

12 | .9498522 .0944518 -0.52 0.605 .7816528 1.154246

13 | 1.359021 .2012923 2.07 0.038 1.016599 1.81678

14 | .6516703 .0876823 -3.18 0.001 .5006091 .8483151

15 | .6846963 .0691441 -3.75 0.000 .5617451 .8345583

17 | 1.083677 .0469114 1.86 0.063 .9955252 1.179635

|

time |

2000 | 1.167826 .0698195 2.59 0.009 1.038695 1.31301

2002 | 1.009346 .0559571 0.17 0.867 .9054208 1.125201

2003 | .8870778 .0517778 -2.05 0.040 .7911849 .9945931

2004 | .9101515 .0582917 -1.47 0.142 .8027817 1.031882

2005 | .7968841 .0493858 -3.66 0.000 .7057374 .8998026

2006 | .7644032 .0548502 -3.74 0.000 .6641161 .8798344

2007 | .7329078 .0531323 -4.29 0.000 .6358306 .8448067

2008 | .6885187 .0527862 -4.87 0.000 .5924575 .8001552

2009 | .6101081 .0494242 -6.10 0.000 .5205373 .7150918

2010 | .6045417 .0526188 -5.78 0.000 .5097278 .7169918

2011 | .6379952 .0546498 -5.25 0.000 .5393922 .7546233

2012 | .6640633 .0564719 -4.81 0.000 .5621126 .7845048

2013 | .617692 .0638013 -4.66 0.000 .5044888 .7562972

2014 | .6111805 .062156 -4.84 0.000 .5007302 .7459937

2015 | .6226139 .074937 -3.94 0.000 .4917783 .7882579

|

\_cons | .0000153 9.17e-07 -184.64 0.000 .0000136 .0000172

ln(hours) | 1 (exposure)

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

**. estat gof**

Deviance goodness-of-fit = 8391.92

Prob > chi2(6217) = 0.0000

Pearson goodness-of-fit = 9323.279

Prob > chi2(6217) = 0.0000

**. glm MR `part\_sigandsub\_lag\_4\_vars' `covariates' ib(freq).state ib(freq).time, family(nbinomial) link(log) vce(cl mineid) exposure(hours) iter(50) eform**

Iteration 0: log pseudolikelihood = -9218.625

Iteration 1: log pseudolikelihood = -9091.6863

Iteration 2: log pseudolikelihood = -9090.6106

Iteration 3: log pseudolikelihood = -9090.6096

Iteration 4: log pseudolikelihood = -9090.6096

Generalized linear models No. of obs = 6,253

Optimization : ML Residual df = 6,217

Scale parameter = 1

Deviance = 3867.456939 (1/df) Deviance = .6220777

Pearson = 4147.19258 (1/df) Pearson = .667073

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

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

AIC = 2.919114

Log pseudolikelihood = -9090.609644 BIC = -50474.2

(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\_4lag | .9999293 .0861968 -0.00 0.999 .8444876 1.183983

p48\_ss\_c\_4lag | 1.001386 .009086 0.15 0.879 .983735 1.019353

p71\_ss\_c\_4lag | .9553625 .0461993 -0.94 0.345 .8689723 1.050341

p72\_ss\_c\_4lag | .9655719 .0297348 -1.14 0.255 .9090168 1.025646

p75\_ss\_c\_4lag | 1.000964 .0002389 4.04 0.000 1.000496 1.001432

p77\_ss\_c\_4lag | 1.003937 .0059738 0.66 0.509 .992297 1.015714

mine\_time | .9948316 .0069738 -0.74 0.460 .9812567 1.008594

onsite\_insp\_hours | .9998866 .0000489 -2.32 0.020 .9997908 .9999825

|

state |

1 | 1.004768 .1064302 0.04 0.964 .816398 1.2366

2 | 1.634893 .0883487 9.10 0.000 1.470588 1.817556

3 | .7316608 .1237965 -1.85 0.065 .5251544 1.019372

4 | 1.10293 .0874613 1.24 0.217 .9441666 1.288391

5 | .8976268 .1519011 -0.64 0.523 .644245 1.250664

6 | .8905646 .0440819 -2.34 0.019 .8082244 .9812933

7 | .9107771 .2082547 -0.41 0.683 .5818081 1.425754

8 | 1.098993 .0440601 2.35 0.019 1.015942 1.188832

9 | .7429889 .0324468 -6.80 0.000 .68204 .8093844

10 | .8258176 .1380996 -1.14 0.252 .5950311 1.146116

11 | .8664996 .2351996 -0.53 0.598 .509004 1.47508

12 | .971443 .0875942 -0.32 0.748 .8140764 1.15923

13 | 1.34259 .2155432 1.84 0.067 .9801426 1.839068

14 | .6350438 .0957795 -3.01 0.003 .4725225 .8534633

15 | .6559698 .0446792 -6.19 0.000 .5739937 .7496535

17 | 1.058697 .0433034 1.39 0.163 .977137 1.147065

|

time |

2000 | 1.111534 .0753626 1.56 0.119 .9732191 1.269505

2002 | .9393168 .0635881 -0.92 0.355 .8226006 1.072593

2003 | .8794536 .0672862 -1.68 0.093 .7569868 1.021733

2004 | .8431087 .0611485 -2.35 0.019 .7313884 .9718943

2005 | .7434357 .053083 -4.15 0.000 .6463469 .8551083

2006 | .7576379 .0586994 -3.58 0.000 .6508985 .8818812

2007 | .6972462 .0536993 -4.68 0.000 .5995561 .8108537

2008 | .6353686 .0485547 -5.93 0.000 .5469872 .7380305

2009 | .5241538 .0437747 -7.73 0.000 .445011 .6173717

2010 | .5696954 .0491632 -6.52 0.000 .4810457 .6746821

2011 | .5999719 .0508044 -6.03 0.000 .5082213 .7082865

2012 | .6157266 .0545485 -5.47 0.000 .5175808 .7324831

2013 | .5129413 .049138 -6.97 0.000 .4251338 .6188848

2014 | .4945589 .0495443 -7.03 0.000 .4063925 .601853

2015 | .5371093 .0563574 -5.92 0.000 .4372688 .6597461

|

\_cons | .0000174 1.14e-06 -167.46 0.000 .0000153 .0000197

ln(hours) | 1 (exposure)

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

**. nbreg MR `part\_sigandsub\_lag\_4\_vars' `covariates' ib(freq).state ib(freq).time, vce(cl mineid) exposure(hours) iter(50) irr**

Fitting Poisson model:

Iteration 0: log pseudolikelihood = -9730.5803

Iteration 1: log pseudolikelihood = -8993.863

Iteration 2: log pseudolikelihood = -8983.399

Iteration 3: log pseudolikelihood = -8983.393

Iteration 4: log pseudolikelihood = -8983.393

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 = -8713.9928

Iteration 1: log pseudolikelihood = -8675.7173

Iteration 2: log pseudolikelihood = -8674.8944

Iteration 3: log pseudolikelihood = -8674.8941

Negative binomial regression Number of obs = 6,253

Wald chi2(35) = .

Dispersion = mean Prob > chi2 = .

Log pseudolikelihood = -8674.8941 Pseudo R2 = 0.0320

(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\_4lag | .9665738 .0986631 -0.33 0.739 .7913134 1.180651

p48\_ss\_c\_4lag | 1.001808 .0087917 0.21 0.837 .9847243 1.019189

p71\_ss\_c\_4lag | .930945 .0476814 -1.40 0.162 .8420288 1.029251

p72\_ss\_c\_4lag | .9781477 .0270489 -0.80 0.424 .9265439 1.032625

p75\_ss\_c\_4lag | 1.000785 .0002293 3.43 0.001 1.000336 1.001235

p77\_ss\_c\_4lag | 1.002777 .0056725 0.49 0.624 .9917209 1.013957

mine\_time | .9935959 .0073669 -0.87 0.386 .9792614 1.00814

onsite\_insp\_hours | .9998842 .0000502 -2.30 0.021 .9997858 .9999827

|

state |

1 | 1.040817 .096371 0.43 0.666 .8680814 1.247926

2 | 1.845731 .1054893 10.72 0.000 1.650136 2.064511

3 | .7283133 .1227536 -1.88 0.060 .5234225 1.013407

4 | 1.140305 .0941039 1.59 0.112 .9700079 1.340499

5 | .9304445 .150403 -0.45 0.656 .6777926 1.277274

6 | .9515952 .0494256 -0.96 0.339 .8594906 1.05357

7 | .957214 .2193211 -0.19 0.849 .6109111 1.499823

8 | .9676493 .041896 -0.76 0.448 .8889223 1.053349

9 | .7639186 .0332347 -6.19 0.000 .7014797 .8319152

10 | .9614116 .1438574 -0.26 0.793 .7170392 1.289068

11 | .8594178 .2182015 -0.60 0.551 .5225032 1.413578

12 | .9590774 .0869979 -0.46 0.645 .8028625 1.145687

13 | 1.320578 .1991421 1.84 0.065 .982661 1.774699

14 | .627704 .0894792 -3.27 0.001 .4746965 .8300297

15 | .66791 .051598 -5.22 0.000 .5740638 .777098

17 | 1.060829 .0427615 1.46 0.143 .9802429 1.148039

|

time |

2000 | 1.148406 .0715312 2.22 0.026 1.016427 1.297522

2002 | .9849637 .0592658 -0.25 0.801 .8753928 1.108249

2003 | .8830899 .0571801 -1.92 0.055 .7778388 1.002583

2004 | .890783 .059048 -1.74 0.081 .7822538 1.014369

2005 | .7816026 .0501131 -3.84 0.000 .6893036 .8862606

2006 | .7783244 .0554882 -3.52 0.000 .6768259 .895044

2007 | .7238965 .0523902 -4.46 0.000 .6281638 .834219

2008 | .6680231 .0481138 -5.60 0.000 .5800754 .7693049

2009 | .5731816 .0447747 -7.12 0.000 .4918127 .6680128

2010 | .5885455 .0477519 -6.53 0.000 .5020158 .6899898

2011 | .623597 .0505211 -5.83 0.000 .5320389 .7309113

2012 | .6402445 .0528333 -5.40 0.000 .5446333 .7526403

2013 | .560265 .052402 -6.19 0.000 .466423 .6729875

2014 | .5462661 .0523501 -6.31 0.000 .4527218 .659139

2015 | .5761507 .0603129 -5.27 0.000 .469278 .7073625

|

\_cons | .0000165 1.01e-06 -180.44 0.000 .0000146 .0000186

ln(hours) | 1 (exposure)

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

/lnalpha | -1.520954 .0970683 -1.711204 -1.330704

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

alpha | .2185033 .0212098 .1806481 .2642913

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**. lrtest pois nbin, stats force**

Likelihood-ratio test LR chi2(1) = 617.00

(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 -8983.393 36 18038.79 18281.46

nbin | 6,253 -8961.932 -8674.894 37 17423.79 17673.2

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

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

**. summ MR pcssv3\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

MR | 6,253 1.881017 3.268911 0 37

pcssv3\_yhat | 6,253 1.921747 2.883544 .00066 35.47914