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

**> form**

Iteration 0: log pseudolikelihood = -5001.0397

Iteration 1: log pseudolikelihood = -4693.2121

Iteration 2: log pseudolikelihood = -4691.7404

Iteration 3: log pseudolikelihood = -4691.7397

Iteration 4: log pseudolikelihood = -4691.7397

Generalized linear models No. of obs = 3,333

Optimization : ML Residual df = 3,304

Scale parameter = 1

Deviance = 4313.033166 (1/df) Deviance = 1.305397

Pearson = 4680.865789 (1/df) Pearson = 1.416727

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

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

AIC = 2.832727

Log pseudolikelihood = -4691.739728 BIC = -22487.79

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

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

| Robust

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

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

p47\_pp\_c\_4lag | .9992439 .0003543 -2.13 0.033 .9985498 .9999385

p48\_pp\_c\_4lag | 1.000066 .0000545 1.21 0.227 .999959 1.000173

p71\_pp\_c\_4lag | .9996226 .0002949 -1.28 0.201 .9990448 1.000201

p72\_pp\_c\_4lag | .9998842 .0001462 -0.79 0.428 .9995976 1.000171

p75\_pp\_c\_4lag | 1.000003 1.03e-06 3.34 0.001 1.000001 1.000005

p77\_pp\_c\_4lag | .9999943 .0000329 -0.17 0.862 .9999298 1.000059

mine\_time | .9868893 .0092508 -1.41 0.159 .9689236 1.005188

onsite\_insp\_hours | .9998694 .0000618 -2.11 0.034 .9997484 .9999905

|

state |

1 | 1.365033 .1861749 2.28 0.023 1.044838 1.783353

2 | 2.434374 .1863716 11.62 0.000 2.095177 2.828485

3 | .7523802 .1089918 -1.96 0.050 .566409 .9994122

4 | 1.209724 .1156491 1.99 0.046 1.003025 1.459018

5 | .9790263 .1970725 -0.11 0.916 .6598606 1.452568

6 | 1.092951 .0772059 1.26 0.208 .9516384 1.255248

7 | 1.204427 .2326527 0.96 0.336 .8248184 1.758743

8 | .8121046 .0515363 -3.28 0.001 .7171246 .9196644

9 | .893776 .0713878 -1.41 0.160 .7642605 1.04524

10 | 1.094971 .1635882 0.61 0.544 .8170219 1.467479

11 | .8190508 .3731345 -0.44 0.661 .3353741 2.000287

12 | .9368393 .1168616 -0.52 0.601 .733645 1.196311

13 | 1.253067 .216574 1.31 0.192 .893011 1.758295

14 | .6733159 .1374177 -1.94 0.053 .4513322 1.00448

15 | .6821101 .0738574 -3.53 0.000 .5516813 .8433749

17 | 1.098757 .0669542 1.55 0.122 .9750625 1.238143

|

time |

2007 | 1.163243 .0713545 2.47 0.014 1.031471 1.311849

2009 | .8950977 .0483675 -2.05 0.040 .8051465 .9950982

2010 | .8977255 .0559 -1.73 0.083 .7945853 1.014254

2011 | .9457739 .0544317 -0.97 0.333 .8448867 1.058708

2012 | .9815164 .0636139 -0.29 0.773 .8644296 1.114463

2013 | .9234532 .0706676 -1.04 0.298 .7948338 1.072886

2014 | .9104468 .0749809 -1.14 0.255 .7747345 1.069932

2015 | .9315914 .0824036 -0.80 0.423 .7833083 1.107945

|

\_cons | .0000103 7.83e-07 -151.40 0.000 8.90e-06 .000012

ln(hours) | 1 (exposure)

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

**. estat gof**

Deviance goodness-of-fit = 4467.79

Prob > chi2(3316) = 0.0000

Pearson goodness-of-fit = 4807.336

Prob > chi2(3316) = 0.0000

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

**> eform**

Iteration 0: log pseudolikelihood = -4866.5332

Iteration 1: log pseudolikelihood = -4788.8298

Iteration 2: log pseudolikelihood = -4788.2589

Iteration 3: log pseudolikelihood = -4788.2589

Generalized linear models No. of obs = 3,333

Optimization : ML Residual df = 3,304

Scale parameter = 1

Deviance = 2003.740931 (1/df) Deviance = .6064591

Pearson = 2126.848328 (1/df) Pearson = .6437192

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

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

AIC = 2.890644

Log pseudolikelihood = -4788.258909 BIC = -24797.08

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

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| Robust

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

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

p47\_pp\_c\_4lag | .9995795 .0003204 -1.31 0.190 .9989517 1.000208

p48\_pp\_c\_4lag | 1.000087 .0000696 1.26 0.209 .9999511 1.000224

p71\_pp\_c\_4lag | .9999932 .0003622 -0.02 0.985 .9992835 1.000703

p72\_pp\_c\_4lag | .9998651 .0001907 -0.71 0.479 .9994915 1.000239

p75\_pp\_c\_4lag | 1.000004 1.26e-06 3.45 0.001 1.000002 1.000007

p77\_pp\_c\_4lag | 1.000004 .0000358 0.10 0.922 .9999333 1.000074

mine\_time | .9924028 .0075204 -1.01 0.314 .977772 1.007253

onsite\_insp\_hours | .9998478 .0000544 -2.80 0.005 .9997412 .9999545

|

state |

1 | 1.287103 .1882123 1.73 0.084 .9663679 1.714288

2 | 2.015904 .1317191 10.73 0.000 1.773587 2.291329

3 | .6964909 .1171631 -2.15 0.032 .5008723 .9685094

4 | 1.16066 .1057098 1.64 0.102 .9709124 1.387491

5 | .9566321 .1917448 -0.22 0.825 .6458511 1.41696

6 | .9672742 .0612628 -0.53 0.599 .8543548 1.095118

7 | 1.107356 .2162313 0.52 0.602 .7552224 1.623678

8 | .7785233 .0501823 -3.88 0.000 .6861271 .8833618

9 | .8011028 .0659897 -2.69 0.007 .6816662 .9414662

10 | .7446208 .1423937 -1.54 0.123 .5118705 1.083204

11 | .909109 .5032738 -0.17 0.863 .3071844 2.690499

12 | .9752627 .1301611 -0.19 0.851 .7507893 1.26685

13 | 1.231935 .2363134 1.09 0.277 .845878 1.794187

14 | .6847406 .1503838 -1.72 0.085 .4452295 1.053097

15 | .6586558 .0576771 -4.77 0.000 .5547797 .7819815

17 | 1.025301 .062308 0.41 0.681 .9101717 1.154992

|

time |

2007 | 1.171042 .0805807 2.29 0.022 1.023294 1.340123

2009 | .8175199 .0546287 -3.02 0.003 .7171647 .9319181

2010 | .8958275 .0651418 -1.51 0.130 .7768331 1.033049

2011 | .9479665 .0626645 -0.81 0.419 .8327699 1.079098

2012 | .960778 .0701534 -0.55 0.584 .8326656 1.108601

2013 | .801494 .0630994 -2.81 0.005 .6868905 .9352184

2014 | .7732779 .0646231 -3.08 0.002 .6564481 .9109002

2015 | .8378953 .0701217 -2.11 0.035 .711139 .9872452

|

\_cons | .0000109 8.01e-07 -155.24 0.000 9.42e-06 .0000126

ln(hours) | 1 (exposure)

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

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

Fitting Poisson model:

Iteration 0: log pseudolikelihood = -4912.1832

Iteration 1: log pseudolikelihood = -4695.4867

Iteration 2: log pseudolikelihood = -4691.7414

Iteration 3: log pseudolikelihood = -4691.7397

Iteration 4: log pseudolikelihood = -4691.7397

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 = -4563.1361

Iteration 1: log pseudolikelihood = -4551.3383

Iteration 2: log pseudolikelihood = -4551.2268

Iteration 3: log pseudolikelihood = -4551.2267

Negative binomial regression Number of obs = 3,333

Wald chi2(28) = .

Dispersion = mean Prob > chi2 = .

Log pseudolikelihood = -4551.2267 Pseudo R2 = 0.0190

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

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

| Robust

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

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

p47\_pp\_c\_4lag | .9994424 .0003235 -1.72 0.085 .9988085 1.000077

p48\_pp\_c\_4lag | 1.000065 .0000573 1.13 0.257 .9999526 1.000177

p71\_pp\_c\_4lag | .9997762 .000317 -0.71 0.480 .9991551 1.000398

p72\_pp\_c\_4lag | .9998643 .000159 -0.85 0.393 .9995529 1.000176

p75\_pp\_c\_4lag | 1.000004 1.17e-06 3.38 0.001 1.000002 1.000006

p77\_pp\_c\_4lag | .9999951 .0000353 -0.14 0.890 .9999259 1.000064

mine\_time | .9891767 .0078625 -1.37 0.171 .9738859 1.004707

onsite\_insp\_hours | .9998581 .0000562 -2.52 0.012 .999748 .9999683

|

state |

1 | 1.321968 .1831592 2.01 0.044 1.007597 1.734424

2 | 2.241484 .1497405 12.08 0.000 1.966399 2.55505

3 | .7204326 .1100294 -2.15 0.032 .5340623 .9718399

4 | 1.173211 .1032203 1.82 0.069 .9873851 1.394009

5 | .967551 .1951844 -0.16 0.870 .6515693 1.436769

6 | 1.016524 .0642678 0.26 0.795 .8980533 1.150624

7 | 1.155351 .2265623 0.74 0.461 .7866738 1.696809

8 | .8022742 .0506107 -3.49 0.000 .7089662 .9078625

9 | .8504168 .0664048 -2.08 0.038 .7297359 .9910553

10 | .8963681 .1532794 -0.64 0.522 .641107 1.253263

11 | .832384 .3958451 -0.39 0.700 .3277403 2.114062

12 | .9598438 .1193338 -0.33 0.742 .7522702 1.224693

13 | 1.233509 .2102753 1.23 0.218 .8831582 1.722844

14 | .6669566 .1404481 -1.92 0.054 .4414191 1.00773

15 | .6771323 .0613229 -4.31 0.000 .5670044 .8086501

17 | 1.060346 .0631034 0.98 0.325 .9436064 1.191529

|

time |

2007 | 1.162591 .0737126 2.38 0.017 1.026733 1.316425

2009 | .854333 .0516363 -2.60 0.009 .7588923 .9617766

2010 | .8828323 .0577924 -1.90 0.057 .7765267 1.003691

2011 | .9407618 .0564262 -1.02 0.309 .8364215 1.058118

2012 | .9562975 .0619863 -0.69 0.491 .8422072 1.085843

2013 | .8439825 .0622735 -2.30 0.022 .7303436 .9753031

2014 | .8232562 .0643459 -2.49 0.013 .7063255 .9595446

2015 | .8663516 .068548 -1.81 0.070 .7418992 1.011681

|

\_cons | .0000108 7.66e-07 -161.54 0.000 9.42e-06 .0000124

ln(hours) | 1 (exposure)

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

/lnalpha | -1.610332 .1210546 -1.847594 -1.373069

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

alpha | .1998213 .0241893 .1576159 .2533282

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**. lrtest pois nbin, stats force**

Likelihood-ratio test LR chi2(13) = 435.78

(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 -4769.118 17 9572.237 9676.134

nbin | 3,333 -4639.57 -4551.227 30 9162.453 9345.802

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

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

**. summ MR pcpp3\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

MR | 6,253 1.881017 3.268911 0 37

pcpp3\_yhat | 6,253 1.61483 2.402868 .0006499 30.38234