. // Model PS.Y.B.SP.V.3

**. eststo: logit dv\_indicator `count\_lag\_4\_vars' `covariates' ib(freq).state ib(freq).time, vce(cl mineid) offset(lnhours) iter(50) or**

note: sp75\_1400\_1\_c\_4lag != 0 predicts success perfectly

sp75\_1400\_1\_c\_4lag dropped and 10 obs not used

note: sp75\_1405\_1\_c\_4lag != 0 predicts success perfectly

sp75\_1405\_1\_c\_4lag dropped and 9 obs not used

note: sp75\_500\_1\_c\_4lag != 0 predicts success perfectly

sp75\_500\_1\_c\_4lag dropped and 9 obs not used

note: sp75\_508\_1\_c\_4lag != 0 predicts success perfectly

sp75\_508\_1\_c\_4lag dropped and 8 obs not used

note: sp75\_1003\_2\_c\_4lag != 0 predicts success perfectly

sp75\_1003\_2\_c\_4lag dropped and 40 obs not used

note: sp75\_1322\_c\_4lag != 0 predicts success perfectly

sp75\_1322\_c\_4lag dropped and 2 obs not used

note: sp75\_812\_c\_4lag != 0 predicts success perfectly

sp75\_812\_c\_4lag dropped and 32 obs not used

note: sp75\_1003\_c\_4lag != 0 predicts success perfectly

sp75\_1003\_c\_4lag dropped and 104 obs not used

note: sp75\_153\_c\_4lag != 0 predicts success perfectly

sp75\_153\_c\_4lag dropped and 9 obs not used

note: sp75\_343\_c\_4lag != 0 predicts success perfectly

sp75\_343\_c\_4lag dropped and 50 obs not used

note: sp48\_24\_c\_4lag != 0 predicts success perfectly

sp48\_24\_c\_4lag dropped and 1 obs not used

note: sp48\_4\_c\_4lag != 0 predicts success perfectly

sp48\_4\_c\_4lag dropped and 3 obs not used

note: sp75\_155\_c\_4lag != 0 predicts success perfectly

sp75\_155\_c\_4lag dropped and 2 obs not used

note: sp75\_215\_c\_4lag != 0 predicts success perfectly

sp75\_215\_c\_4lag dropped and 7 obs not used

note: sp75\_156\_c\_4lag != 0 predicts success perfectly

sp75\_156\_c\_4lag dropped and 8 obs not used

note: sp75\_327\_c\_4lag != 0 predicts success perfectly

sp75\_327\_c\_4lag dropped and 3 obs not used

note: 17.state != 0 predicts success perfectly

17.state dropped and 11 obs not used

note: sp75\_510\_c\_4lag omitted because of collinearity

Iteration 0: log pseudolikelihood = -1949.707

Iteration 1: log pseudolikelihood = -1711.5261

Iteration 2: log pseudolikelihood = -1670.5299

Iteration 3: log pseudolikelihood = -1665.9041

Iteration 4: log pseudolikelihood = -1665.0163

Iteration 5: log pseudolikelihood = -1664.9631

Iteration 6: log pseudolikelihood = -1664.9628

Iteration 7: log pseudolikelihood = -1664.9628

Logistic regression Number of obs = 5,945

Wald chi2(103) = .

Log pseudolikelihood = -1664.9628 Prob > chi2 = .

(Std. Err. adjusted for 1,234 clusters in mineid)

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

| Robust

dv\_indicator | Odds Ratio Std. Err. z P>|z| [95% Conf. Interval]

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

sp48\_11\_c\_4lag | 1.314144 .1157044 3.10 0.002 1.105856 1.561664

sp75\_1311\_c\_4lag | .7787447 .1913042 -1.02 0.309 .4811621 1.260372

sp75\_1400\_1\_c\_4lag | 1 (omitted)

sp75\_1404\_1\_c\_4lag | .8192475 .4155603 -0.39 0.694 .3031421 2.214032

sp75\_1405\_1\_c\_4lag | 1 (omitted)

sp75\_500\_1\_c\_4lag | 1 (omitted)

sp75\_501\_c\_4lag | .8582341 .0852587 -1.54 0.124 .7063918 1.042716

sp75\_506\_1\_c\_4lag | 1.028769 .2134564 0.14 0.891 .6850221 1.54501

sp75\_507\_1\_c\_4lag | 1.01982 .0381197 0.53 0.600 .9477776 1.097338

sp75\_508\_1\_c\_4lag | 1 (omitted)

sp75\_512\_1\_c\_4lag | 1.222384 .3208019 0.77 0.444 .7308343 2.044545

sp75\_811\_c\_4lag | 1.066128 .1317422 0.52 0.604 .8368079 1.358291

sp75\_1002\_c\_4lag | .9708445 .052781 -0.54 0.586 .8727165 1.080006

sp75\_1003\_2\_c\_4lag | 1 (omitted)

sp75\_1322\_c\_4lag | 1 (omitted)

sp75\_1719\_2\_c\_4lag | .8307636 .1429255 -1.08 0.281 .5929743 1.163909

sp75\_212\_c\_4lag | 1.445079 .2494519 2.13 0.033 1.030281 2.026877

sp75\_332\_c\_4lag | .7585167 .0900722 -2.33 0.020 .6010171 .9572898

sp75\_501\_2\_c\_4lag | .8090941 .0750153 -2.28 0.022 .6746518 .9703276

sp75\_502\_c\_4lag | .7594913 .2529154 -0.83 0.409 .3954279 1.458741

sp75\_602\_c\_4lag | 1.112038 .0846335 1.40 0.163 .9579383 1.290927

sp75\_812\_c\_4lag | 1 (omitted)

sp75\_1003\_c\_4lag | 1 (omitted)

sp75\_153\_c\_4lag | 1 (omitted)

sp75\_203\_c\_4lag | 1.009936 .0176207 0.57 0.571 .9759836 1.045069

sp75\_213\_c\_4lag | 1.154438 .7348289 0.23 0.821 .3315578 4.019591

sp75\_343\_c\_4lag | 1 (omitted)

sp75\_373\_c\_4lag | .8178971 .3179508 -0.52 0.605 .3817694 1.752251

sp75\_503\_c\_4lag | .9934169 .0045316 -1.45 0.148 .9845746 1.002339

sp75\_523\_c\_4lag | .9750316 .0302949 -0.81 0.416 .9174264 1.036254

sp75\_523\_3\_c\_4lag | .9694034 .011184 -2.69 0.007 .9477292 .9915733

sp75\_603\_c\_4lag | .9627343 .0744266 -0.49 0.623 .8273746 1.120239

sp75\_703\_3\_c\_4lag | 1.033807 .1004139 0.34 0.732 .8545979 1.250595

sp48\_24\_c\_4lag | 1 (omitted)

sp48\_4\_c\_4lag | 1 (omitted)

sp75\_1404\_c\_4lag | .3728527 .1393997 -2.64 0.008 .1791825 .775852

sp75\_1719\_4\_c\_4lag | .9045382 .0574922 -1.58 0.114 .7985917 1.02454

sp75\_204\_c\_4lag | 1.047536 .0353526 1.38 0.169 .9804879 1.119169

sp75\_334\_c\_4lag | 1.026449 .0601795 0.45 0.656 .9150242 1.151443

sp75\_524\_c\_4lag | 1.281961 .5264618 0.60 0.545 .5732085 2.867062

sp75\_604\_c\_4lag | 1.030142 .0141975 2.15 0.031 1.002688 1.058348

sp75\_703\_4\_c\_4lag | .8828735 .5680653 -0.19 0.846 .2501565 3.115912

sp48\_25\_c\_4lag | 1.111892 .2272809 0.52 0.604 .7448503 1.6598

sp48\_5\_c\_4lag | .8308541 .1362634 -1.13 0.259 .6024545 1.145843

sp75\_1315\_c\_4lag | .6098018 .1492586 -2.02 0.043 .3774363 .985221

sp75\_1403\_5\_c\_4lag | .988082 .0524654 -0.23 0.821 .8904216 1.096454

sp75\_1405\_c\_4lag | 1.631014 .4691131 1.70 0.089 .9281854 2.86603

sp75\_155\_c\_4lag | 1 (omitted)

sp75\_1725\_c\_4lag | 1.011972 .0109632 1.10 0.272 .9907112 1.03369

sp75\_205\_c\_4lag | 1.030947 .2647407 0.12 0.906 .6232371 1.705374

sp75\_215\_c\_4lag | 1 (omitted)

sp75\_505\_c\_4lag | 1.205044 .4254247 0.53 0.597 .60325 2.407178

sp75\_605\_c\_4lag | 1.053742 .0382791 1.44 0.150 .9813247 1.131503

sp48\_26\_c\_4lag | .9999636 .0822084 -0.00 1.000 .8511493 1.174796

sp48\_6\_c\_4lag | .9474907 .0777577 -0.66 0.511 .8067136 1.112834

sp75\_1316\_c\_4lag | .9209622 .2851892 -0.27 0.790 .5019437 1.689774

sp75\_1403\_6\_c\_4lag | .9729799 .0398388 -0.67 0.504 .8979482 1.054281

sp75\_156\_c\_4lag | 1 (omitted)

sp75\_1906\_c\_4lag | 1.025832 .2660106 0.10 0.922 .6170913 1.705309

sp75\_1916\_c\_4lag | .7968117 .3551786 -0.51 0.610 .3326081 1.90888

sp75\_606\_c\_4lag | .9537513 .0170821 -2.64 0.008 .9208519 .9878261

sp75\_816\_c\_4lag | .9541805 .0497749 -0.90 0.369 .861445 1.056899

sp75\_906\_c\_4lag | .86007 .2585489 -0.50 0.616 .4771456 1.550303

sp48\_27\_c\_4lag | .8206349 .1267734 -1.28 0.201 .606254 1.110824

sp48\_7\_c\_4lag | 1.174643 .1567455 1.21 0.228 .904317 1.525777

sp75\_1403\_7\_c\_4lag | .903987 .1424729 -0.64 0.522 .6637561 1.231164

sp75\_207\_c\_4lag | 1.135963 .2368498 0.61 0.541 .7548963 1.709389

sp75\_327\_c\_4lag | 1 (omitted)

sp75\_337\_c\_4lag | .9842139 .0667918 -0.23 0.815 .861637 1.124229

sp75\_507\_c\_4lag | .9235008 .0804477 -0.91 0.361 .778552 1.095436

sp75\_607\_c\_4lag | 1.112676 .1018669 1.17 0.244 .9299086 1.331366

sp75\_807\_c\_4lag | 1.033367 .02194 1.55 0.122 .9912475 1.077276

sp75\_817\_c\_4lag | .3702915 .1670317 -2.20 0.028 .1529616 .896407

sp48\_28\_c\_4lag | 1.114426 .1615049 0.75 0.455 .8388671 1.480502

sp48\_8\_c\_4lag | 1.310869 .1593025 2.23 0.026 1.033041 1.663417

sp75\_1318\_c\_4lag | .3137207 .2403565 -1.51 0.130 .069887 1.408282

sp75\_1403\_8\_c\_4lag | 1.796551 .8996348 1.17 0.242 .6732783 4.793849

sp75\_208\_c\_4lag | .9051805 .0216633 -4.16 0.000 .8637017 .9486513

sp75\_388\_c\_4lag | 1.01624 .0659653 0.25 0.804 .8948365 1.154114

sp75\_209\_c\_4lag | 1.00547 .0608052 0.09 0.928 .8930858 1.131996

sp75\_389\_c\_4lag | 1.029245 .1606236 0.18 0.853 .7580201 1.397517

sp75\_509\_c\_4lag | 1.599769 .5835221 1.29 0.198 .7826693 3.269915

sp75\_100\_c\_4lag | 1.06889 .4143518 0.17 0.864 .4999967 2.285065

sp75\_1400\_c\_4lag | .8204667 .0837816 -1.94 0.053 .6716466 1.002261

sp75\_1403\_10\_c\_4lag | 1.034833 .0571078 0.62 0.535 .9287441 1.153039

sp75\_160\_c\_4lag | 1.289186 .4680769 0.70 0.484 .6327933 2.626451

sp75\_1720\_c\_4lag | 1.055323 .0658877 0.86 0.388 .9337738 1.192694

sp75\_340\_c\_4lag | 1.114569 .0500077 2.42 0.016 1.020741 1.217021

sp75\_500\_c\_4lag | 1.040155 .0811621 0.50 0.614 .8926472 1.212038

sp75\_510\_c\_4lag | 1 (omitted)

sp75\_810\_c\_4lag | .9173519 .0352378 -2.25 0.025 .8508228 .9890831

mine\_time | 1.017809 .0199307 0.90 0.367 .9794859 1.057632

onsite\_insp\_hours | 1.003742 .000503 7.45 0.000 1.002756 1.004728

|

state |

1 | 1.11801 .8890598 0.14 0.888 .2352647 5.312941

2 | .5714263 .1023466 -3.12 0.002 .4022572 .8117394

3 | 1.315523 .5677837 0.64 0.525 .5645694 3.065347

4 | 4.652424 3.276533 2.18 0.029 1.170063 18.49906

5 | .9762353 .4851591 -0.05 0.961 .3685813 2.585685

6 | .5685832 .0824136 -3.90 0.000 .4279727 .7553913

7 | 2.391674 3.092122 0.67 0.500 .1897621 30.14355

8 | .9113233 .1388882 -0.61 0.542 .6760004 1.228564

9 | .1423212 .0300977 -9.22 0.000 .0940285 .2154167

10 | .6898917 .2779739 -0.92 0.357 .3131925 1.519674

11 | 2.308915 1.977975 0.98 0.329 .430735 12.37672

12 | .5279614 .1171464 -2.88 0.004 .3417699 .8155874

13 | 1.958019 1.321588 1.00 0.319 .5215408 7.350986

14 | .4151198 .1853794 -1.97 0.049 .173003 .9960777

15 | .6893907 .1198542 -2.14 0.032 .4903199 .9692846

17 | 1 (empty)

|

time |

2000 | .9038831 .1743903 -0.52 0.600 .6192786 1.319284

2002 | .6581403 .1275998 -2.16 0.031 .4500782 .9623852

2003 | .8521535 .197053 -0.69 0.489 .5416079 1.340759

2004 | .5088678 .1119197 -3.07 0.002 .3306685 .7830998

2005 | .4656083 .0998876 -3.56 0.000 .3057815 .7089738

2006 | .5019178 .107611 -3.22 0.001 .3297124 .7640644

2007 | .3061406 .0693894 -5.22 0.000 .196331 .4773676

2008 | .2347147 .053311 -6.38 0.000 .1503855 .3663319

2009 | .2690644 .0700795 -5.04 0.000 .1614936 .448288

2010 | .1836091 .0470638 -6.61 0.000 .1110987 .3034445

2011 | .2289348 .0603565 -5.59 0.000 .1365527 .383816

2012 | .1556412 .0399874 -7.24 0.000 .0940662 .2575226

2013 | .2241442 .0668289 -5.02 0.000 .1249512 .4020819

2014 | .1396517 .0421142 -6.53 0.000 .0773309 .2521969

2015 | .0961337 .0315792 -7.13 0.000 .0504966 .1830159

|

\_cons | .0001347 .0000247 -48.66 0.000 .0000941 .0001928

lnhours | 1 (offset)

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

Note: 0 failures and 68 successes completely determined.

(est1 stored)

**. lfit**

Logistic model for dv\_indicator, goodness-of-fit test

number of observations = 5945

number of covariate patterns = 5929

Pearson chi2(5822) = 5666.01

Prob > chi2 = 0.9268

**. linktest**

Iteration 0: log likelihood = -2770.1843

Iteration 1: log likelihood = -1932.6292

Iteration 2: log likelihood = -1695.886

Iteration 3: log likelihood = -1667.8042

Iteration 4: log likelihood = -1667.0598

Iteration 5: log likelihood = -1658.8828

Iteration 6: log likelihood = -1657.5263

Iteration 7: log likelihood = -1657.5217

Iteration 8: log likelihood = -1657.5217

Logistic regression Number of obs = 5,945

LR chi2(2) = 2225.33

Prob > chi2 = 0.0000

Log likelihood = -1657.5217 Pseudo R2 = 0.4017

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

dv\_indicator | Coef. Std. Err. z P>|z| [95% Conf. Interval]

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

\_hat | .9883503 .0423671 23.33 0.000 .9053122 1.071388

\_hatsq | .0548955 .017516 3.13 0.002 .0205648 .0892262

\_cons | -.1200914 .0561927 -2.14 0.033 -.230227 -.0099557

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

Note: 0 failures and 255 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

-------- True --------

Classified | D ~D | Total

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

+ | 4730 564 | 5294

- | 166 485 | 651

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

Total | 4896 1049 | 5945

Classified + if predicted Pr(D) >= .5

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

Sensitivity Pr( +| D) 96.61%

Specificity Pr( -|~D) 46.23%

Positive predictive value Pr( D| +) 89.35%

Negative predictive value Pr(~D| -) 74.50%

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

False + rate for true ~D Pr( +|~D) 53.77%

False - rate for true D Pr( -| D) 3.39%

False + rate for classified + Pr(~D| +) 10.65%

False - rate for classified - Pr( D| -) 25.50%

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

Correctly classified 87.72%

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

**. summ dv\_indicator bv3\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

dv\_indicator | 6,253 .8322405 .3736824 0 1

bv3\_yhat | 5,945 .8235492 .2334699 .0022698 1