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

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

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

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

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

sp48\_4\_pp\_c\_4lag dropped and 2 obs not used

note: sp75\_100\_pp\_c\_4lag != 0 predicts success perfectly

sp75\_100\_pp\_c\_4lag dropped and 42 obs not used

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

sp75\_1003\_pp\_c\_4lag dropped and 126 obs not used

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

sp75\_1003\_2\_pp\_c\_4lag dropped and 6 obs not used

note: sp75\_1318\_pp\_c\_4lag != 0 predicts failure perfectly

sp75\_1318\_pp\_c\_4lag dropped and 1 obs not used

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

sp75\_1400\_1\_pp\_c\_4lag dropped and 9 obs not used

note: sp75\_1403\_8\_pp\_c\_4lag != 0 predicts success perfectly

sp75\_1403\_8\_pp\_c\_4lag dropped and 185 obs not used

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

sp75\_1405\_1\_pp\_c\_4lag dropped and 5 obs not used

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

sp75\_153\_pp\_c\_4lag dropped and 6 obs not used

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

sp75\_156\_pp\_c\_4lag dropped and 7 obs not used

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

sp75\_215\_pp\_c\_4lag dropped and 4 obs not used

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

sp75\_343\_pp\_c\_4lag dropped and 31 obs not used

note: sp75\_373\_pp\_c\_4lag != 0 predicts success perfectly

sp75\_373\_pp\_c\_4lag dropped and 1 obs not used

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

sp75\_500\_1\_pp\_c\_4lag dropped and 5 obs not used

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

sp75\_508\_1\_pp\_c\_4lag dropped and 4 obs not used

note: sp75\_509\_pp\_c\_4lag != 0 predicts success perfectly

sp75\_509\_pp\_c\_4lag dropped and 49 obs not used

note: sp75\_512\_1\_pp\_c\_4lag != 0 predicts success perfectly

sp75\_512\_1\_pp\_c\_4lag dropped and 9 obs not used

note: sp75\_524\_pp\_c\_4lag != 0 predicts success perfectly

sp75\_524\_pp\_c\_4lag dropped and 9 obs not used

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

sp75\_812\_pp\_c\_4lag dropped and 15 obs not used

note: 17.state != 0 predicts success perfectly

17.state dropped and 11 obs not used

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

Iteration 0: log pseudolikelihood = -1927.1393

Iteration 1: log pseudolikelihood = -1710.5195

Iteration 2: log pseudolikelihood = -1669.8028

Iteration 3: log pseudolikelihood = -1665.2978

Iteration 4: log pseudolikelihood = -1664.9674

Iteration 5: log pseudolikelihood = -1664.9615

Iteration 6: log pseudolikelihood = -1664.9615

Logistic regression Number of obs = 5,725

Wald chi2(96) = .

Log pseudolikelihood = -1664.9615 Prob > chi2 = .

(Std. Err. adjusted for 1,227 clusters in mineid)

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

| Robust

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

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

sp48\_11\_pp\_c\_4lag | 1.008516 .0034305 2.49 0.013 1.001814 1.015262

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

sp48\_25\_pp\_c\_4lag | 1.001545 .0042675 0.36 0.717 .9932161 1.009945

sp48\_26\_pp\_c\_4lag | .9996379 .001606 -0.23 0.822 .9964952 1.00279

sp48\_27\_pp\_c\_4lag | .996494 .0019112 -1.83 0.067 .9927551 1.000247

sp48\_28\_pp\_c\_4lag | 1.005806 .00373 1.56 0.119 .9985216 1.013143

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

sp48\_5\_pp\_c\_4lag | .996346 .0027905 -1.31 0.191 .9908918 1.00183

sp48\_6\_pp\_c\_4lag | .9993079 .0015709 -0.44 0.660 .9962339 1.002391

sp48\_7\_pp\_c\_4lag | 1.000596 .0017776 0.34 0.737 .9971176 1.004086

sp48\_8\_pp\_c\_4lag | 1.002526 .0028556 0.89 0.376 .9969449 1.008139

sp75\_100\_pp\_c\_4lag | 1 (omitted)

sp75\_1002\_pp\_c\_4lag | .999611 .0009358 -0.42 0.678 .9977785 1.001447

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

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

sp75\_1311\_pp\_c\_4lag | .9959917 .0061347 -0.65 0.514 .9840402 1.008088

sp75\_1315\_pp\_c\_4lag | .9879402 .0088913 -1.35 0.178 .9706664 1.005521

sp75\_1316\_pp\_c\_4lag | .991746 .0022128 -3.71 0.000 .9874184 .9960925

sp75\_1318\_pp\_c\_4lag | 1 (omitted)

sp75\_1400\_pp\_c\_4lag | .9985431 .0043048 -0.34 0.735 .9901414 1.007016

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

sp75\_1403\_10\_pp\_c\_4lag | 1.004026 .0014759 2.73 0.006 1.001137 1.006923

sp75\_1403\_5\_pp\_c\_4lag | 1.001354 .001277 1.06 0.289 .9988547 1.00386

sp75\_1403\_6\_pp\_c\_4lag | .9996512 .0009488 -0.37 0.713 .9977934 1.001513

sp75\_1403\_7\_pp\_c\_4lag | 1.000178 .0047929 0.04 0.970 .9908282 1.009616

sp75\_1403\_8\_pp\_c\_4lag | 1 (omitted)

sp75\_1404\_pp\_c\_4lag | .9803478 .0073077 -2.66 0.008 .966129 .9947758

sp75\_1404\_1\_pp\_c\_4lag | .9870837 .0082058 -1.56 0.118 .9711309 1.003299

sp75\_1405\_pp\_c\_4lag | 1.006651 .0049476 1.35 0.177 .9970004 1.016395

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

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

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

sp75\_160\_pp\_c\_4lag | .9988863 .0071655 -0.16 0.877 .9849404 1.01303

sp75\_1719\_2\_pp\_c\_4lag | .9931411 .0034953 -1.96 0.051 .9863141 1.000015

sp75\_1719\_4\_pp\_c\_4lag | .9990831 .0008957 -1.02 0.306 .9973291 1.00084

sp75\_1720\_pp\_c\_4lag | 1.000601 .0010026 0.60 0.549 .9986374 1.002568

sp75\_1725\_pp\_c\_4lag | 1.000231 .0001859 1.24 0.214 .9998668 1.000595

sp75\_1906\_pp\_c\_4lag | .999082 .0026417 -0.35 0.728 .9939178 1.004273

sp75\_1916\_pp\_c\_4lag | .9912516 .0057309 -1.52 0.129 .9800826 1.002548

sp75\_203\_pp\_c\_4lag | 1.00018 .0002847 0.63 0.526 .9996226 1.000738

sp75\_204\_pp\_c\_4lag | 1.000612 .0005482 1.12 0.264 .9995377 1.001687

sp75\_205\_pp\_c\_4lag | 1.005353 .0057902 0.93 0.354 .9940684 1.016766

sp75\_207\_pp\_c\_4lag | 1.003296 .0037546 0.88 0.379 .9959644 1.010682

sp75\_208\_pp\_c\_4lag | .99804 .0004782 -4.09 0.000 .9971031 .9989777

sp75\_209\_pp\_c\_4lag | 1.000706 .0015091 0.47 0.640 .9977526 1.003668

sp75\_212\_pp\_c\_4lag | 1.009258 .0042006 2.21 0.027 1.001059 1.017525

sp75\_213\_pp\_c\_4lag | 1.001527 .0153673 0.10 0.921 .9718557 1.032104

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

sp75\_332\_pp\_c\_4lag | .9977637 .0033262 -0.67 0.502 .9912657 1.004304

sp75\_334\_pp\_c\_4lag | 1.000541 .0010691 0.51 0.613 .9984475 1.002638

sp75\_337\_pp\_c\_4lag | .9996124 .0008927 -0.43 0.664 .9978642 1.001364

sp75\_340\_pp\_c\_4lag | 1.002143 .0009093 2.36 0.018 1.000362 1.003926

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

sp75\_373\_pp\_c\_4lag | 1 (omitted)

sp75\_388\_pp\_c\_4lag | .99906 .0012881 -0.73 0.466 .9965386 1.001588

sp75\_389\_pp\_c\_4lag | 1.002318 .0037295 0.62 0.534 .9950351 1.009655

sp75\_500\_pp\_c\_4lag | 1.000357 .0019875 0.18 0.858 .9964689 1.00426

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

sp75\_501\_pp\_c\_4lag | .9981476 .0026824 -0.69 0.490 .992904 1.003419

sp75\_501\_2\_pp\_c\_4lag | .9992995 .0025598 -0.27 0.784 .9942951 1.004329

sp75\_502\_pp\_c\_4lag | .9962578 .0044369 -0.84 0.400 .9875996 1.004992

sp75\_503\_pp\_c\_4lag | .9997427 .0000832 -3.09 0.002 .9995797 .9999057

sp75\_505\_pp\_c\_4lag | 1.0021 .005548 0.38 0.705 .9912852 1.013034

sp75\_506\_1\_pp\_c\_4lag | 1.001378 .0064116 0.22 0.830 .9888899 1.014023

sp75\_507\_pp\_c\_4lag | .9995767 .0016529 -0.26 0.798 .9963423 1.002822

sp75\_507\_1\_pp\_c\_4lag | 1.000935 .0008002 1.17 0.242 .9993683 1.002505

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

sp75\_509\_pp\_c\_4lag | 1 (omitted)

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

sp75\_512\_1\_pp\_c\_4lag | 1 (omitted)

sp75\_523\_pp\_c\_4lag | .9988333 .0007197 -1.62 0.105 .9974237 1.000245

sp75\_523\_3\_pp\_c\_4lag | .9996628 .0002357 -1.43 0.153 .9992009 1.000125

sp75\_524\_pp\_c\_4lag | 1 (omitted)

sp75\_602\_pp\_c\_4lag | .9998353 .0016018 -0.10 0.918 .9967007 1.00298

sp75\_603\_pp\_c\_4lag | .9987401 .0020119 -0.63 0.531 .9948046 1.002691

sp75\_604\_pp\_c\_4lag | 1.000413 .000234 1.77 0.077 .9999547 1.000872

sp75\_605\_pp\_c\_4lag | 1.00076 .0007931 0.96 0.338 .9992063 1.002315

sp75\_606\_pp\_c\_4lag | .9992566 .0003442 -2.16 0.031 .9985822 .9999315

sp75\_607\_pp\_c\_4lag | 1.002962 .0017154 1.73 0.084 .9996059 1.00633

sp75\_703\_3\_pp\_c\_4lag | 1.002272 .003366 0.68 0.499 .9956968 1.008891

sp75\_703\_4\_pp\_c\_4lag | 1.000304 .0098974 0.03 0.976 .9810921 1.019891

sp75\_807\_pp\_c\_4lag | 1.000482 .000411 1.17 0.241 .9996764 1.001287

sp75\_810\_pp\_c\_4lag | .9977886 .0008682 -2.54 0.011 .9960884 .9994917

sp75\_811\_pp\_c\_4lag | 1.002715 .0021076 1.29 0.197 .9985922 1.006854

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

sp75\_816\_pp\_c\_4lag | .9992022 .0008528 -0.94 0.350 .9975321 1.000875

sp75\_817\_pp\_c\_4lag | .9878748 .0067583 -1.78 0.075 .9747173 1.00121

sp75\_906\_pp\_c\_4lag | .9964813 .0051589 -0.68 0.496 .9864212 1.006644

mine\_time | 1.008936 .020195 0.44 0.657 .9701209 1.049304

onsite\_insp\_hours | 1.004023 .0004806 8.39 0.000 1.003082 1.004966

|

state |

1 | 1.154526 .948873 0.17 0.861 .2305818 5.78073

2 | .5943791 .0843431 -3.67 0.000 .4500669 .7849646

3 | 1.247327 .5495207 0.50 0.616 .5259884 2.957907

4 | 4.789639 3.540698 2.12 0.034 1.124759 20.39605

5 | 1.013935 .5237108 0.03 0.979 .3684283 2.790403

6 | .5278584 .0761092 -4.43 0.000 .397912 .7002415

7 | 2.18242 2.932119 0.58 0.561 .1567959 30.37681

8 | .8507074 .1114789 -1.23 0.217 .6580161 1.099826

9 | .2056339 .0319082 -10.19 0.000 .1517098 .2787249

10 | .6557008 .2678099 -1.03 0.301 .2944739 1.460039

11 | 2.60958 2.269671 1.10 0.270 .4745062 14.35157

12 | .5080348 .1109742 -3.10 0.002 .3310994 .7795221

13 | 1.95077 1.267923 1.03 0.304 .545706 6.973541

14 | .4192432 .1828273 -1.99 0.046 .1783473 .9855202

15 | .675474 .1159374 -2.29 0.022 .4825137 .9456005

17 | 1 (empty)

|

time |

2000 | .9678287 .1855116 -0.17 0.865 .6647246 1.409143

2002 | .6768788 .1315835 -2.01 0.045 .462423 .9907916

2003 | .8823639 .2037898 -0.54 0.588 .5611192 1.387523

2004 | .5177683 .1124738 -3.03 0.002 .3382445 .7925748

2005 | .4587169 .0974083 -3.67 0.000 .3025468 .6954998

2006 | .4858117 .1050313 -3.34 0.001 .3180097 .7421567

2007 | .3210045 .0715709 -5.10 0.000 .2073615 .4969289

2008 | .2718544 .0636062 -5.57 0.000 .1718619 .4300246

2009 | .3341493 .0887002 -4.13 0.000 .1986042 .5622023

2010 | .2139528 .0547187 -6.03 0.000 .1296051 .3531946

2011 | .258169 .0667254 -5.24 0.000 .1555628 .4284522

2012 | .1819772 .0456154 -6.80 0.000 .1113398 .2974292

2013 | .2598573 .076547 -4.57 0.000 .1458793 .4628881

2014 | .1573706 .0467695 -6.22 0.000 .0878926 .2817704

2015 | .1091784 .0354973 -6.81 0.000 .0577278 .2064853

|

\_cons | .0001239 .0000228 -48.91 0.000 .0000864 .0001777

lnhours | 1 (offset)

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

Note: 0 failures and 57 successes completely determined.

(est1 stored)

**. lfit**

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

number of observations = 5725

number of covariate patterns = 5709

Pearson chi2(5609) = 4744.37

Prob > chi2 = 1.0000

**. linktest**

Iteration 0: log likelihood = -2725.0834

Iteration 1: log likelihood = -1902.1367

Iteration 2: log likelihood = -1686.8118

Iteration 3: log likelihood = -1669.6927

Iteration 4: log likelihood = -1656.894

Iteration 5: log likelihood = -1655.4944

Iteration 6: log likelihood = -1655.4713

Iteration 7: log likelihood = -1655.4713

Logistic regression Number of obs = 5,725

LR chi2(2) = 2139.22

Prob > chi2 = 0.0000

Log likelihood = -1655.4713 Pseudo R2 = 0.3925

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

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

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

\_hat | .9777217 .0410197 23.84 0.000 .8973245 1.058119

\_hatsq | .0664809 .0176291 3.77 0.000 .0319286 .1010333

\_cons | -.1356125 .0568178 -2.39 0.017 -.2469733 -.0242518

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

Note: 0 failures and 223 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 4512 561 | 5073

- | 165 487 | 652

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

Total | 4677 1048 | 5725

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

True D defined as dv\_indicator != 0

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

Sensitivity Pr( +| D) 96.47%

Specificity Pr( -|~D) 46.47%

Positive predictive value Pr( D| +) 88.94%

Negative predictive value Pr(~D| -) 74.69%

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

False + rate for true ~D Pr( +|~D) 53.53%

False - rate for true D Pr( -| D) 3.53%

False + rate for classified + Pr(~D| +) 11.06%

False - rate for classified - Pr( D| -) 25.31%

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

Correctly classified 87.32%

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

**. summ dv\_indicator bpp3\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bpp3\_yhat | 5,725 .8169432 .234936 .0024049 1