// Model PS.Y.B.SP.PP.4

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

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

sp75\_100\_pp\_c\_lag\_all dropped and 79 obs not used

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

sp75\_1003\_pp\_c\_lag\_all dropped and 164 obs not used

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

sp75\_1003\_2\_pp\_c\_lag\_all dropped and 8 obs not used

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

sp75\_1400\_1\_pp\_c\_lag\_all dropped and 23 obs not used

note: sp75\_1404\_1\_pp\_c\_lag\_all != 0 predicts success perfectly

sp75\_1404\_1\_pp\_c\_lag\_all dropped and 21 obs not used

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

sp75\_153\_pp\_c\_lag\_all dropped and 19 obs not used

note: sp75\_1719\_2\_pp\_c\_lag\_all != 0 predicts success perfectly

sp75\_1719\_2\_pp\_c\_lag\_all dropped and 59 obs not used

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

sp75\_215\_pp\_c\_lag\_all dropped and 2 obs not used

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

sp75\_343\_pp\_c\_lag\_all dropped and 60 obs not used

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

sp75\_373\_pp\_c\_lag\_all dropped and 1 obs not used

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

sp75\_500\_1\_pp\_c\_lag\_all dropped and 4 obs not used

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

sp75\_512\_1\_pp\_c\_lag\_all dropped and 22 obs not used

note: sp75\_703\_4\_pp\_c\_lag\_all != 0 predicts success perfectly

sp75\_703\_4\_pp\_c\_lag\_all dropped and 3 obs not used

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

sp75\_812\_pp\_c\_lag\_all dropped and 35 obs not used

note: sp75\_817\_pp\_c\_lag\_all != 0 predicts success perfectly

sp75\_817\_pp\_c\_lag\_all dropped and 22 obs not used

note: 17.state != 0 predicts success perfectly

17.state dropped and 4 obs not used

note: sp48\_24\_pp\_c\_lag\_all omitted because of collinearity

note: sp48\_4\_pp\_c\_lag\_all omitted because of collinearity

note: sp75\_510\_pp\_c\_lag\_all omitted because of collinearity

Iteration 0: log pseudolikelihood = -1925.6263

Iteration 1: log pseudolikelihood = -1696.9485

Iteration 2: log pseudolikelihood = -1651.6145

Iteration 3: log pseudolikelihood = -1644.1948

Iteration 4: log pseudolikelihood = -1641.8047

Iteration 5: log pseudolikelihood = -1641.1913

Iteration 6: log pseudolikelihood = -1640.9566

Iteration 7: log pseudolikelihood = -1640.9465

Iteration 8: log pseudolikelihood = -1640.9465

Logistic regression Number of obs = 5,727

Wald chi2(96) = .

Log pseudolikelihood = -1640.9465 Prob > chi2 = .

(Std. Err. adjusted for 1,219 clusters in mineid)

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

| Robust

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

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

sp48\_11\_pp\_c\_lag\_all | 1.00262 .0013606 1.93 0.054 .9999566 1.00529

sp48\_24\_pp\_c\_lag\_all | 1 (omitted)

sp48\_25\_pp\_c\_lag\_all | 1.001171 .0024214 0.48 0.629 .9964361 1.005928

sp48\_26\_pp\_c\_lag\_all | .9980835 .0007533 -2.54 0.011 .9966081 .9995612

sp48\_27\_pp\_c\_lag\_all | 1.000033 .0015938 0.02 0.983 .9969144 1.003162

sp48\_28\_pp\_c\_lag\_all | 1.002793 .0023391 1.20 0.232 .9982187 1.007388

sp48\_4\_pp\_c\_lag\_all | 1 (omitted)

sp48\_5\_pp\_c\_lag\_all | 1.000202 .0042264 0.05 0.962 .9919528 1.00852

sp48\_6\_pp\_c\_lag\_all | .9991612 .0013164 -0.64 0.524 .9965845 1.001745

sp48\_7\_pp\_c\_lag\_all | .9967113 .0009543 -3.44 0.001 .9948427 .9985835

sp48\_8\_pp\_c\_lag\_all | 1.000343 .0012523 0.27 0.784 .9978914 1.0028

sp75\_100\_pp\_c\_lag\_all | 1 (omitted)

sp75\_1002\_pp\_c\_lag\_all | .9996182 .0008424 -0.45 0.650 .9979685 1.001271

sp75\_1003\_pp\_c\_lag\_all | 1 (omitted)

sp75\_1003\_2\_pp\_c\_lag\_all | 1 (omitted)

sp75\_1311\_pp\_c\_lag\_all | 1.001288 .0016287 0.79 0.429 .9981012 1.004486

sp75\_1315\_pp\_c\_lag\_all | .9918858 .0075406 -1.07 0.284 .9772161 1.006776

sp75\_1316\_pp\_c\_lag\_all | .98814 .005253 -2.24 0.025 .9778977 .9984896

sp75\_1318\_pp\_c\_lag\_all | .992762 .0024262 -2.97 0.003 .988018 .9975287

sp75\_1400\_pp\_c\_lag\_all | .9953827 .0030217 -1.52 0.127 .9894779 1.001323

sp75\_1400\_1\_pp\_c\_lag\_all | 1 (omitted)

sp75\_1403\_10\_pp\_c\_lag\_all | 1.000465 .000828 0.56 0.574 .9988433 1.002089

sp75\_1403\_5\_pp\_c\_lag\_all | .9998183 .0003657 -0.50 0.619 .9991019 1.000535

sp75\_1403\_6\_pp\_c\_lag\_all | .9990999 .0004302 -2.09 0.036 .9982571 .9999434

sp75\_1403\_7\_pp\_c\_lag\_all | 1.0026 .0022349 1.16 0.244 .9982293 1.00699

sp75\_1403\_8\_pp\_c\_lag\_all | 1.004551 .0025418 1.79 0.073 .9995816 1.009545

sp75\_1404\_pp\_c\_lag\_all | .9923001 .0025182 -3.05 0.002 .9873769 .9972479

sp75\_1404\_1\_pp\_c\_lag\_all | 1 (omitted)

sp75\_1405\_pp\_c\_lag\_all | 1.017501 .0098833 1.79 0.074 .9983136 1.037058

sp75\_1405\_1\_pp\_c\_lag\_all | .9868043 .0040152 -3.26 0.001 .9789658 .9947054

sp75\_153\_pp\_c\_lag\_all | 1 (omitted)

sp75\_156\_pp\_c\_lag\_all | .9932686 .0046336 -1.45 0.148 .9842283 1.002392

sp75\_160\_pp\_c\_lag\_all | 1.006161 .0048144 1.28 0.199 .9967686 1.015641

sp75\_1719\_2\_pp\_c\_lag\_all | 1 (omitted)

sp75\_1719\_4\_pp\_c\_lag\_all | .9999357 .0012965 -0.05 0.960 .9973978 1.00248

sp75\_1720\_pp\_c\_lag\_all | 1.001442 .0007147 2.02 0.043 1.000042 1.002844

sp75\_1725\_pp\_c\_lag\_all | .9999956 .0000714 -0.06 0.951 .9998558 1.000136

sp75\_1906\_pp\_c\_lag\_all | .9952581 .002339 -2.02 0.043 .9906842 .9998531

sp75\_1916\_pp\_c\_lag\_all | .9987333 .0014754 -0.86 0.391 .9958458 1.001629

sp75\_203\_pp\_c\_lag\_all | 1.000163 .0002175 0.75 0.453 .9997371 1.00059

sp75\_204\_pp\_c\_lag\_all | 1.000227 .0003638 0.62 0.532 .9995144 1.000941

sp75\_205\_pp\_c\_lag\_all | 1.010017 .0080044 1.26 0.209 .9944498 1.025828

sp75\_207\_pp\_c\_lag\_all | 1.007765 .0027397 2.85 0.004 1.00241 1.013149

sp75\_208\_pp\_c\_lag\_all | .9990338 .0003016 -3.20 0.001 .9984429 .999625

sp75\_209\_pp\_c\_lag\_all | 1.000482 .0011648 0.41 0.679 .9982013 1.002767

sp75\_212\_pp\_c\_lag\_all | 1.001924 .0018583 1.04 0.300 .9982888 1.005573

sp75\_213\_pp\_c\_lag\_all | 1.000725 .0108114 0.07 0.947 .9797577 1.022141

sp75\_215\_pp\_c\_lag\_all | 1 (omitted)

sp75\_332\_pp\_c\_lag\_all | 1.000823 .0030337 0.27 0.786 .9948944 1.006786

sp75\_334\_pp\_c\_lag\_all | .9989172 .0010532 -1.03 0.304 .9968551 1.000984

sp75\_337\_pp\_c\_lag\_all | .9988397 .0008713 -1.33 0.183 .9971334 1.000549

sp75\_340\_pp\_c\_lag\_all | 1.001071 .0004949 2.17 0.030 1.000102 1.002042

sp75\_343\_pp\_c\_lag\_all | 1 (omitted)

sp75\_373\_pp\_c\_lag\_all | 1 (omitted)

sp75\_388\_pp\_c\_lag\_all | .9997158 .000661 -0.43 0.667 .9984211 1.001012

sp75\_389\_pp\_c\_lag\_all | 1.003241 .0040203 0.81 0.419 .9953921 1.011152

sp75\_500\_pp\_c\_lag\_all | 1.000876 .0012919 0.68 0.498 .9983471 1.003411

sp75\_500\_1\_pp\_c\_lag\_all | 1 (omitted)

sp75\_501\_pp\_c\_lag\_all | .9998432 .0022326 -0.07 0.944 .995477 1.004229

sp75\_501\_2\_pp\_c\_lag\_all | .9963 .0018241 -2.02 0.043 .9927312 .9998816

sp75\_502\_pp\_c\_lag\_all | .9957716 .0062227 -0.68 0.498 .9836498 1.008043

sp75\_503\_pp\_c\_lag\_all | .9999082 .00005 -1.84 0.066 .9998103 1.000006

sp75\_505\_pp\_c\_lag\_all | 1.008705 .0042006 2.08 0.037 1.000505 1.016972

sp75\_506\_1\_pp\_c\_lag\_all | 1.000028 .0017928 0.02 0.987 .9965205 1.003548

sp75\_507\_pp\_c\_lag\_all | 1.000254 .0017402 0.15 0.884 .9968491 1.00367

sp75\_507\_1\_pp\_c\_lag\_all | 1.000752 .0005344 1.41 0.159 .999705 1.0018

sp75\_508\_1\_pp\_c\_lag\_all | .9951837 .0043425 -1.11 0.269 .9867089 1.003731

sp75\_509\_pp\_c\_lag\_all | 1.009196 .0030728 3.01 0.003 1.003191 1.015236

sp75\_510\_pp\_c\_lag\_all | 1 (omitted)

sp75\_512\_1\_pp\_c\_lag\_all | 1 (omitted)

sp75\_523\_pp\_c\_lag\_all | .9998759 .0004253 -0.29 0.770 .9990426 1.00071

sp75\_523\_3\_pp\_c\_lag\_all | .9999859 .0001401 -0.10 0.920 .9997114 1.00026

sp75\_524\_pp\_c\_lag\_all | 1.004574 .0039146 1.17 0.242 .9969311 1.012276

sp75\_602\_pp\_c\_lag\_all | 1.000666 .0010529 0.63 0.527 .9986043 1.002732

sp75\_603\_pp\_c\_lag\_all | .9998013 .0018587 -0.11 0.915 .9961649 1.003451

sp75\_604\_pp\_c\_lag\_all | 1.000257 .000126 2.04 0.042 1.00001 1.000504

sp75\_605\_pp\_c\_lag\_all | 1.001271 .0005146 2.47 0.013 1.000263 1.00228

sp75\_606\_pp\_c\_lag\_all | .9999187 .0002423 -0.34 0.737 .9994438 1.000394

sp75\_607\_pp\_c\_lag\_all | 1.00233 .001125 2.07 0.038 1.000127 1.004537

sp75\_703\_3\_pp\_c\_lag\_all | 1.002966 .0020546 1.45 0.148 .9989475 1.007002

sp75\_703\_4\_pp\_c\_lag\_all | 1 (omitted)

sp75\_807\_pp\_c\_lag\_all | .9999248 .000361 -0.21 0.835 .9992175 1.000633

sp75\_810\_pp\_c\_lag\_all | .998404 .0005166 -3.09 0.002 .997392 .999417

sp75\_811\_pp\_c\_lag\_all | 1.002945 .0018662 1.58 0.114 .9992943 1.00661

sp75\_812\_pp\_c\_lag\_all | 1 (omitted)

sp75\_816\_pp\_c\_lag\_all | .9998825 .0007767 -0.15 0.880 .9983614 1.001406

sp75\_817\_pp\_c\_lag\_all | 1 (omitted)

sp75\_906\_pp\_c\_lag\_all | .9999348 .0043365 -0.02 0.988 .9914714 1.00847

mine\_time | 1.00173 .0212682 0.08 0.935 .9609005 1.044294

onsite\_insp\_hours | 1.003997 .0004449 9.00 0.000 1.003126 1.00487

|

state |

1 | 1.077905 .9419372 0.09 0.932 .1944242 5.976002

2 | .7999507 .115181 -1.55 0.121 .6032577 1.060776

3 | 1.638723 .8118614 1.00 0.319 .6205836 4.327235

4 | 5.023402 3.835613 2.11 0.035 1.124771 22.4353

5 | 1.304745 .849456 0.41 0.683 .3642085 4.674137

6 | .5106161 .0751708 -4.57 0.000 .3826345 .6814043

7 | 1.79244 1.633741 0.64 0.522 .3003354 10.69751

8 | .8378 .1136549 -1.30 0.192 .6421957 1.092983

9 | .2180113 .0476324 -6.97 0.000 .1420704 .3345451

10 | .4859564 .1989886 -1.76 0.078 .2177954 1.084291

11 | 3.840749 4.240123 1.22 0.223 .4412692 33.42937

12 | .519235 .1157351 -2.94 0.003 .3354556 .803698

13 | 1.978933 1.33119 1.01 0.310 .529474 7.396354

14 | .4778364 .1983419 -1.78 0.075 .2118164 1.07795

15 | .6705577 .1220038 -2.20 0.028 .4694241 .957871

17 | 1 (empty)

|

time |

2000 | 1.00501 .1918097 0.03 0.979 .6913783 1.460916

2002 | .677345 .1318571 -2.00 0.045 .4624967 .9919989

2003 | .8911569 .2065939 -0.50 0.619 .5657479 1.403736

2004 | .5330185 .1180534 -2.84 0.004 .3453166 .8227484

2005 | .4908272 .104936 -3.33 0.001 .3228097 .746295

2006 | .5075821 .1111384 -3.10 0.002 .3304686 .779619

2007 | .3273713 .0733716 -4.98 0.000 .2109922 .5079429

2008 | .2333601 .0529703 -6.41 0.000 .149559 .3641166

2009 | .2796578 .073834 -4.83 0.000 .166685 .4691993

2010 | .1956852 .0507407 -6.29 0.000 .1177181 .3252913

2011 | .2350391 .0604404 -5.63 0.000 .1419886 .3890693

2012 | .1661073 .0425565 -7.01 0.000 .1005337 .2744514

2013 | .2247077 .0662874 -5.06 0.000 .126043 .4006058

2014 | .1458888 .0453832 -6.19 0.000 .079292 .2684196

2015 | .0878941 .0304895 -7.01 0.000 .0445336 .173473

|

\_cons | .0001206 .0000224 -48.50 0.000 .0000838 .0001737

lnhours | 1 (offset)

**. lfit**

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

number of observations = 5727

number of covariate patterns = 5712

Pearson chi2(5609) = 9227.81

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -2726.9833

Iteration 1: log likelihood = -2101.2193

Iteration 2: log likelihood = -1668.4942

Iteration 3: log likelihood = -1632.7493

Iteration 4: log likelihood = -1631.1473

Iteration 5: log likelihood = -1631.1362

Iteration 6: log likelihood = -1631.1362

Logistic regression Number of obs = 5,727

LR chi2(2) = 2191.69

Prob > chi2 = 0.0000

Log likelihood = -1631.1362 Pseudo R2 = 0.4019

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

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

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

\_hat | .97958 .0402739 24.32 0.000 .9006447 1.058515

\_hatsq | .0675336 .0173119 3.90 0.000 .033603 .1014643

\_cons | -.1384984 .0569721 -2.43 0.015 -.2501616 -.0268351

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

Note: 0 failures and 352 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 4505 564 | 5069

- | 173 485 | 658

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

Total | 4678 1049 | 5727

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

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

Sensitivity Pr( +| D) 96.30%

Specificity Pr( -|~D) 46.23%

Positive predictive value Pr( D| +) 88.87%

Negative predictive value Pr(~D| -) 73.71%

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

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

False - rate for true D Pr( -| D) 3.70%

False + rate for classified + Pr(~D| +) 11.13%

False - rate for classified - Pr( D| -) 26.29%

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

Correctly classified 87.13%

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

**. summ dv\_indicator bpp4\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bpp4\_yhat | 5,727 .8168325 .237732 .0020106 1