. // Model PS.Q.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\_4\_pp\_c\_4lag != 0 predicts success perfectly

sp48\_4\_pp\_c\_4lag dropped and 4 obs not used

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

sp75\_1003\_2\_pp\_c\_4lag dropped and 63 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\_510\_pp\_c\_4lag != 0 predicts success perfectly

sp75\_510\_pp\_c\_4lag dropped and 5 obs not used

Iteration 0: log pseudolikelihood = -11225.03

Iteration 1: log pseudolikelihood = -10621.498

Iteration 2: log pseudolikelihood = -10571.884

Iteration 3: log pseudolikelihood = -10570.503

Iteration 4: log pseudolikelihood = -10570.453

Iteration 5: log pseudolikelihood = -10570.452

Logistic regression Number of obs = 22,373

Wald chi2(159) = .

Log pseudolikelihood = -10570.452 Prob > chi2 = .

(Std. Err. adjusted for 1,293 clusters in mineid)

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

| Robust

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

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

sp48\_11\_pp\_c\_4lag | 1.003181 .0016826 1.89 0.058 .9998882 1.006484

sp48\_24\_pp\_c\_4lag | 1.003538 .0003412 10.39 0.000 1.00287 1.004207

sp48\_25\_pp\_c\_4lag | 1.001128 .0033003 0.34 0.732 .9946804 1.007618

sp48\_26\_pp\_c\_4lag | 1.001462 .0018537 0.79 0.430 .9978352 1.005102

sp48\_27\_pp\_c\_4lag | .9952518 .0026118 -1.81 0.070 .9901458 1.000384

sp48\_28\_pp\_c\_4lag | .9962411 .0028595 -1.31 0.189 .9906523 1.001861

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

sp48\_5\_pp\_c\_4lag | .9995253 .0027627 -0.17 0.864 .9941251 1.004955

sp48\_6\_pp\_c\_4lag | .9979429 .0013545 -1.52 0.129 .9952916 1.000601

sp48\_7\_pp\_c\_4lag | 1.003794 .0017252 2.20 0.028 1.000418 1.007181

sp48\_8\_pp\_c\_4lag | 1.004027 .0027241 1.48 0.139 .998702 1.00938

sp75\_100\_pp\_c\_4lag | 1.017918 .0112079 1.61 0.107 .9961858 1.040123

sp75\_1002\_pp\_c\_4lag | .9987396 .0009273 -1.36 0.174 .9969238 1.000559

sp75\_1003\_pp\_c\_4lag | 1.002927 .0036065 0.81 0.416 .9958829 1.01002

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

sp75\_1311\_pp\_c\_4lag | .9887419 .0053487 -2.09 0.036 .978314 .999281

sp75\_1315\_pp\_c\_4lag | 1.004779 .0269652 0.18 0.859 .9532938 1.059044

sp75\_1316\_pp\_c\_4lag | .9891925 .0051996 -2.07 0.039 .9790537 .9994363

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

sp75\_1400\_pp\_c\_4lag | 1.002506 .0039649 0.63 0.527 .9947646 1.010307

sp75\_1400\_1\_pp\_c\_4lag | 1.001705 .0102373 0.17 0.868 .9818401 1.021972

sp75\_1403\_10\_pp\_c\_4lag | 1.002688 .0011493 2.34 0.019 1.000438 1.004943

sp75\_1403\_5\_pp\_c\_4lag | 1.000631 .0010728 0.59 0.557 .9985301 1.002735

sp75\_1403\_6\_pp\_c\_4lag | 1.00101 .0006896 1.47 0.143 .9996598 1.002363

sp75\_1403\_7\_pp\_c\_4lag | .9924448 .0030134 -2.50 0.013 .9865562 .9983686

sp75\_1403\_8\_pp\_c\_4lag | .9989572 .000783 -1.33 0.183 .9974237 1.000493

sp75\_1404\_pp\_c\_4lag | .9913899 .0074662 -1.15 0.251 .976864 1.006132

sp75\_1404\_1\_pp\_c\_4lag | .9989192 .0090381 -0.12 0.905 .9813609 1.016792

sp75\_1405\_pp\_c\_4lag | 1.001072 .0013892 0.77 0.440 .9983532 1.003799

sp75\_1405\_1\_pp\_c\_4lag | 1.013134 .0078057 1.69 0.090 .9979503 1.028549

sp75\_153\_pp\_c\_4lag | 1.006736 .0127246 0.53 0.595 .9821028 1.031987

sp75\_156\_pp\_c\_4lag | .9956912 .0081361 -0.53 0.597 .9798717 1.011766

sp75\_160\_pp\_c\_4lag | 1.014524 .012364 1.18 0.237 .9905776 1.039048

sp75\_1719\_2\_pp\_c\_4lag | 1.001867 .006499 0.29 0.774 .9892102 1.014686

sp75\_1719\_4\_pp\_c\_4lag | 1.000421 .001399 0.30 0.764 .9976826 1.003167

sp75\_1720\_pp\_c\_4lag | 1.000557 .0008556 0.65 0.515 .998882 1.002236

sp75\_1725\_pp\_c\_4lag | 1.000267 .0001599 1.67 0.095 .9999537 1.00058

sp75\_1906\_pp\_c\_4lag | 1.003458 .0029848 1.16 0.246 .9976251 1.009325

sp75\_1916\_pp\_c\_4lag | 1.000581 .0032903 0.18 0.860 .9941531 1.007051

sp75\_203\_pp\_c\_4lag | 1.00022 .0003401 0.65 0.517 .9995538 1.000887

sp75\_204\_pp\_c\_4lag | 1.001018 .0005597 1.82 0.069 .9999217 1.002116

sp75\_205\_pp\_c\_4lag | 1.008146 .0051751 1.58 0.114 .9980542 1.018341

sp75\_207\_pp\_c\_4lag | 1.006904 .0034733 1.99 0.046 1.000119 1.013735

sp75\_208\_pp\_c\_4lag | .9988288 .0006043 -1.94 0.053 .9976452 1.000014

sp75\_209\_pp\_c\_4lag | .9990157 .0018363 -0.54 0.592 .9954231 1.002621

sp75\_212\_pp\_c\_4lag | 1.007142 .0025757 2.78 0.005 1.002106 1.012203

sp75\_213\_pp\_c\_4lag | .99086 .0053957 -1.69 0.092 .9803409 1.001492

sp75\_215\_pp\_c\_4lag | .9900701 .0092888 -1.06 0.287 .9720307 1.008444

sp75\_332\_pp\_c\_4lag | 1.005047 .0037094 1.36 0.173 .9978026 1.012343

sp75\_334\_pp\_c\_4lag | 1.000897 .0014476 0.62 0.535 .9980641 1.003738

sp75\_337\_pp\_c\_4lag | .9997551 .0011653 -0.21 0.834 .9974737 1.002042

sp75\_340\_pp\_c\_4lag | 1.000882 .0005489 1.61 0.108 .9998066 1.001958

sp75\_343\_pp\_c\_4lag | 1.017378 .0100611 1.74 0.081 .9978485 1.03729

sp75\_373\_pp\_c\_4lag | 1.027004 .0179607 1.52 0.128 .9923985 1.062817

sp75\_388\_pp\_c\_4lag | .9996096 .0013336 -0.29 0.770 .9969991 1.002227

sp75\_389\_pp\_c\_4lag | .9997264 .0041583 -0.07 0.948 .9916094 1.00791

sp75\_500\_pp\_c\_4lag | 1.000225 .0015972 0.14 0.888 .9970991 1.00336

sp75\_500\_1\_pp\_c\_4lag | .9905183 .0078135 -1.21 0.227 .9753218 1.005951

sp75\_501\_pp\_c\_4lag | .9966942 .0033081 -1.00 0.318 .9902315 1.003199

sp75\_501\_2\_pp\_c\_4lag | 1.000513 .0033893 0.15 0.880 .9938916 1.007178

sp75\_502\_pp\_c\_4lag | 1.007859 .0059986 1.32 0.188 .9961699 1.019684

sp75\_503\_pp\_c\_4lag | 1.000015 .0001076 0.14 0.888 .9998042 1.000226

sp75\_505\_pp\_c\_4lag | 1.004019 .0046 0.88 0.381 .9950438 1.013076

sp75\_506\_1\_pp\_c\_4lag | 1.000494 .0027185 0.18 0.856 .99518 1.005836

sp75\_507\_pp\_c\_4lag | .9981204 .0021553 -0.87 0.384 .993905 1.002354

sp75\_507\_1\_pp\_c\_4lag | 1.000562 .000808 0.70 0.486 .9989799 1.002147

sp75\_508\_1\_pp\_c\_4lag | .9984942 .0076049 -0.20 0.843 .9836997 1.013511

sp75\_509\_pp\_c\_4lag | 1.001654 .0060182 0.28 0.783 .9899279 1.013519

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

sp75\_512\_1\_pp\_c\_4lag | .993617 .0082547 -0.77 0.441 .9775692 1.009928

sp75\_523\_pp\_c\_4lag | 1.000256 .0009291 0.28 0.783 .9984366 1.002079

sp75\_523\_3\_pp\_c\_4lag | .9998829 .0003072 -0.38 0.703 .999281 1.000485

sp75\_524\_pp\_c\_4lag | 1.008685 .0065956 1.32 0.186 .9958406 1.021696

sp75\_602\_pp\_c\_4lag | 1.001317 .0015 0.88 0.379 .9983819 1.004262

sp75\_603\_pp\_c\_4lag | 1.004025 .0022188 1.82 0.069 .9996852 1.008383

sp75\_604\_pp\_c\_4lag | 1.000329 .0002101 1.57 0.117 .9999173 1.000741

sp75\_605\_pp\_c\_4lag | 1.000288 .0006124 0.47 0.638 .9990886 1.001489

sp75\_606\_pp\_c\_4lag | 1.000073 .0003546 0.21 0.836 .9993787 1.000769

sp75\_607\_pp\_c\_4lag | .9992851 .0012099 -0.59 0.555 .9969166 1.001659

sp75\_703\_3\_pp\_c\_4lag | 1.000627 .0013338 0.47 0.638 .9980164 1.003245

sp75\_703\_4\_pp\_c\_4lag | .9895191 .0075009 -1.39 0.165 .9749262 1.00433

sp75\_807\_pp\_c\_4lag | 1.000703 .0004178 1.68 0.092 .9998846 1.001522

sp75\_810\_pp\_c\_4lag | .9989752 .0014903 -0.69 0.492 .9960585 1.0019

sp75\_811\_pp\_c\_4lag | .9991971 .0016473 -0.49 0.626 .9959737 1.002431

sp75\_812\_pp\_c\_4lag | .9929197 .0048134 -1.47 0.143 .9835302 1.002399

sp75\_816\_pp\_c\_4lag | .9986745 .0008742 -1.52 0.130 .9969626 1.000389

sp75\_817\_pp\_c\_4lag | 1.008256 .0082357 1.01 0.314 .9922424 1.024527

sp75\_906\_pp\_c\_4lag | .993187 .004555 -1.49 0.136 .9842994 1.002155

mine\_time | 1.000092 .0026249 0.03 0.972 .9949601 1.00525

onsite\_insp\_hours | 1.00349 .0004812 7.27 0.000 1.002547 1.004434

|

state |

AL | 1.113055 .4136837 0.29 0.773 .5372234 2.306102

AR | 1.851945 .1898381 6.01 0.000 1.514864 2.264032

CO | 1.700944 .333636 2.71 0.007 1.158054 2.498337

IL | 3.980245 1.135133 4.84 0.000 2.275905 6.960901

IN | 1.404445 .2693373 1.77 0.077 .9644191 2.045238

MD | 1.735164 .4650117 2.06 0.040 1.026183 2.933976

MT | .6033126 .0654961 -4.65 0.000 .4876804 .746362

NM | 4.019593 .3590555 15.57 0.000 3.374017 4.78869

OH | 1.367643 .3270917 1.31 0.191 .8558461 2.185496

OK | 3.767303 1.586391 3.15 0.002 1.650418 8.599376

PA | 1.754499 .209773 4.70 0.000 1.387973 2.217815

TN | 1.998558 .4515157 3.06 0.002 1.28355 3.111866

UT | .4936463 .1619668 -2.15 0.031 .2594981 .9390693

VA | 1.073566 .0874779 0.87 0.384 .9151028 1.259469

WV | 1.667263 .1283581 6.64 0.000 1.433747 1.938813

WY | 4.921295 .6179755 12.69 0.000 3.847623 6.294573

|

time |

2000.75 | 2.018376 .3586142 3.95 0.000 1.424837 2.859164

2001 | 2.448255 .4496587 4.88 0.000 1.708129 3.509074

2001.25 | 2.521801 .4378369 5.33 0.000 1.794422 3.544027

2001.5 | 2.960596 .5183322 6.20 0.000 2.100648 4.172583

2001.75 | 2.405224 .4187166 5.04 0.000 1.709909 3.383281

2002 | 2.563314 .4501619 5.36 0.000 1.816838 3.616491

2002.25 | 2.216678 .3912651 4.51 0.000 1.568401 3.13291

2002.5 | 3.047388 .5334006 6.37 0.000 2.162407 4.294554

2002.75 | 2.081992 .3646231 4.19 0.000 1.477089 2.934618

2003 | 2.240973 .415237 4.35 0.000 1.558528 3.222244

2003.25 | 2.402813 .4504598 4.68 0.000 1.663963 3.469735

2003.5 | 3.693632 .7082907 6.81 0.000 2.536455 5.378733

2003.75 | 1.932123 .3486054 3.65 0.000 1.356612 2.75178

2004 | 2.019805 .3615561 3.93 0.000 1.422131 2.86866

2004.25 | 1.831122 .328134 3.38 0.001 1.288793 2.601663

2004.5 | 2.106153 .367647 4.27 0.000 1.49591 2.96534

2004.75 | 1.651271 .2792359 2.97 0.003 1.185433 2.300168

2005 | 1.749674 .3145117 3.11 0.002 1.230127 2.488654

2005.25 | 1.776902 .3114897 3.28 0.001 1.260226 2.505408

2005.5 | 1.965408 .3452775 3.85 0.000 1.392887 2.773253

2005.75 | 1.414579 .2427443 2.02 0.043 1.010554 1.980135

2006 | 1.758276 .3023235 3.28 0.001 1.255246 2.462892

2006.25 | 1.598819 .2738972 2.74 0.006 1.14282 2.236766

2006.5 | 1.926086 .324765 3.89 0.000 1.384048 2.680403

2006.75 | 1.566651 .2744544 2.56 0.010 1.111359 2.208464

2007 | 1.297125 .2119722 1.59 0.111 .9416313 1.786827

2007.25 | 1.281359 .2095138 1.52 0.129 .9300183 1.765428

2007.5 | 1.534989 .2480248 2.65 0.008 1.118323 2.106896

2007.75 | 1.223111 .1979957 1.24 0.213 .8905827 1.679799

2008 | 1.116304 .1948005 0.63 0.528 .7929465 1.571525

2008.25 | 1.097183 .1840493 0.55 0.580 .7897548 1.524283

2008.5 | 1.063883 .168274 0.39 0.695 .7802964 1.450535

2009 | 1.038068 .182167 0.21 0.831 .7359553 1.4642

2009.25 | 1.031904 .1837427 0.18 0.860 .7279022 1.462871

2009.5 | 1.122032 .192994 0.67 0.503 .8009312 1.571865

2009.75 | .8530562 .1479117 -0.92 0.359 .607278 1.198306

2010 | 1.065287 .1966617 0.34 0.732 .7418691 1.5297

2010.25 | .9514899 .1657018 -0.29 0.775 .6763439 1.338569

2010.5 | 1.311014 .2364661 1.50 0.133 .9206127 1.866971

2010.75 | .7982842 .1485031 -1.21 0.226 .5543836 1.149489

2011 | .8886461 .1508941 -0.70 0.487 .6370784 1.239552

2011.25 | 1.063534 .1892606 0.35 0.729 .7503714 1.507393

2011.5 | 1.392535 .2538546 1.82 0.069 .9741702 1.99057

2011.75 | .8626115 .1553385 -0.82 0.412 .6060821 1.227719

2012 | .9606545 .169133 -0.23 0.820 .6803064 1.356532

2012.25 | 1.041771 .1880105 0.23 0.821 .7313993 1.483851

2012.5 | .9911861 .1868356 -0.05 0.963 .6850247 1.434182

2012.75 | .5012943 .0938394 -3.69 0.000 .3473383 .7234904

2013 | .8137279 .1539836 -1.09 0.276 .5615706 1.179109

2013.25 | .813554 .162656 -1.03 0.302 .5497984 1.203842

2013.5 | .8461359 .1705276 -0.83 0.407 .570022 1.255997

2013.75 | .5474837 .1090102 -3.03 0.002 .3705845 .8088259

2014 | .6354502 .1366303 -2.11 0.035 .4169287 .9685036

2014.25 | .6256874 .127567 -2.30 0.021 .4195772 .9330458

2014.5 | .6943977 .1516068 -1.67 0.095 .4526543 1.065246

2014.75 | .8141996 .1768259 -0.95 0.344 .5319478 1.246214

2015 | .6309133 .1343996 -2.16 0.031 .4155693 .9578465

2015.25 | .4958332 .1090065 -3.19 0.001 .3222575 .7629009

2015.5 | .9315619 .2038885 -0.32 0.746 .6066127 1.430579

2015.75 | .5627685 .1255493 -2.58 0.010 .3634405 .8714173

2016 | .3607485 .0918036 -4.01 0.000 .2190736 .5940446

|

\_cons | .0000307 4.57e-06 -69.83 0.000 .0000229 .0000411

lnhours | 1 (offset)

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

Note: 0 failures and 3 successes completely determined.

(est1 stored)

**. lfit**

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

number of observations = 22373

number of covariate patterns = 22369

Pearson chi2(22205) = 56267.84

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -14835.512

Iteration 1: log likelihood = -10843.279

Iteration 2: log likelihood = -10602.949

Iteration 3: log likelihood = -10472.077

Iteration 4: log likelihood = -10411.106

Iteration 5: log likelihood = -10410.86

Iteration 6: log likelihood = -10410.86

Logistic regression Number of obs = 22,373

LR chi2(2) = 8849.30

Prob > chi2 = 0.0000

Log likelihood = -10410.86 Pseudo R2 = 0.2982

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

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

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

\_hat | .9829707 .0152905 64.29 0.000 .9530018 1.01294

\_hatsq | .1191601 .0055557 21.45 0.000 .1082711 .1300491

\_cons | -.1494662 .0189244 -7.90 0.000 -.1865573 -.1123752

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

Note: 0 failures and 82 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 11944 3080 | 15024

- | 1971 5378 | 7349

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

Total | 13915 8458 | 22373

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

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

Sensitivity Pr( +| D) 85.84%

Specificity Pr( -|~D) 63.58%

Positive predictive value Pr( D| +) 79.50%

Negative predictive value Pr(~D| -) 73.18%

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

False + rate for true ~D Pr( +|~D) 36.42%

False - rate for true D Pr( -| D) 14.16%

False + rate for classified + Pr(~D| +) 20.50%

False - rate for classified - Pr( D| -) 26.82%

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

Correctly classified 77.42%

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

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

Variable | Obs Mean Std. Dev. Min Max

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

dv\_indicator | 30,289 .5522797 .4972675 0 1

bpp3\_yhat | 22,373 .621955 .2795149 .0001582 1