. // Model PS.Q.B.SP.V.2

**. eststo: logit dv\_indicator `count\_lag\_1\_vars' `covariates' ib(freq).state ib(freq).time, vce(cl mineid) offset(lnhours) iter(50) or**

note: sp75\_1400\_1\_1lag != 0 predicts success perfectly

sp75\_1400\_1\_1lag dropped and 7 obs not used

note: sp75\_1405\_1\_1lag != 0 predicts success perfectly

sp75\_1405\_1\_1lag dropped and 5 obs not used

note: sp75\_1003\_2\_1lag != 0 predicts success perfectly

sp75\_1003\_2\_1lag dropped and 29 obs not used

note: sp75\_1322\_1lag != 0 predicts success perfectly

sp75\_1322\_1lag dropped and 1 obs not used

note: sp48\_24\_1lag != 0 predicts success perfectly

sp48\_24\_1lag dropped and 1 obs not used

note: sp75\_155\_1lag != 0 predicts success perfectly

sp75\_155\_1lag dropped and 3 obs not used

note: sp75\_327\_1lag != 0 predicts success perfectly

sp75\_327\_1lag dropped and 2 obs not used

note: sp75\_510\_1lag != 0 predicts success perfectly

sp75\_510\_1lag dropped and 2 obs not used

Iteration 0: log pseudolikelihood = -13378.524

Iteration 1: log pseudolikelihood = -12698.894

Iteration 2: log pseudolikelihood = -12655.875

Iteration 3: log pseudolikelihood = -12654.884

Iteration 4: log pseudolikelihood = -12654.876

Iteration 5: log pseudolikelihood = -12654.876

Logistic regression Number of obs = 26,060

Wald chi2(161) = .

Log pseudolikelihood = -12654.876 Prob > chi2 = .

(Std. Err. adjusted for 1,475 clusters in mineid)

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

| Robust

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

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

sp48\_11\_1lag | 1.028057 .1880931 0.15 0.880 .7182602 1.471475

sp75\_1311\_1lag | .7139793 .365944 -0.66 0.511 .2614626 1.949672

sp75\_1400\_1\_1lag | 1 (omitted)

sp75\_1404\_1\_1lag | 2.485371 2.059525 1.10 0.272 .4898188 12.61093

sp75\_1405\_1\_1lag | 1 (omitted)

sp75\_500\_1\_1lag | .1377905 .1459642 -1.87 0.061 .0172792 1.098788

sp75\_501\_1lag | .9219563 .2047932 -0.37 0.715 .5965321 1.424908

sp75\_506\_1\_1lag | 1.296619 .4215203 0.80 0.424 .6856362 2.45206

sp75\_507\_1\_1lag | .9438187 .0667913 -0.82 0.414 .8215831 1.084241

sp75\_508\_1\_1lag | .0633811 .022162 -7.89 0.000 .0319394 .1257747

sp75\_512\_1\_1lag | 1.407866 1.323291 0.36 0.716 .2230972 8.884411

sp75\_811\_1lag | 1.067975 .1759599 0.40 0.690 .773245 1.475045

sp75\_1002\_1lag | 1.012777 .1145089 0.11 0.911 .811472 1.264021

sp75\_1003\_2\_1lag | 1 (omitted)

sp75\_1322\_1lag | 1 (omitted)

sp75\_1719\_2\_1lag | .6730344 .2329525 -1.14 0.253 .3415208 1.326348

sp75\_212\_1lag | 1.384649 .2806227 1.61 0.108 .9307415 2.059919

sp75\_332\_1lag | .8283153 .2219996 -0.70 0.482 .4898491 1.400648

sp75\_501\_2\_1lag | .9201467 .2031246 -0.38 0.706 .5969697 1.41828

sp75\_502\_1lag | .4852271 .2537003 -1.38 0.167 .1741388 1.352056

sp75\_602\_1lag | 1.167975 .1555009 1.17 0.244 .8997191 1.516213

sp75\_812\_1lag | .8638414 .6830059 -0.19 0.853 .1834095 4.06861

sp75\_1003\_1lag | 1.162894 .3439285 0.51 0.610 .6513213 2.076275

sp75\_153\_1lag | .7319837 1.020431 -0.22 0.823 .0476292 11.24939

sp75\_203\_1lag | 1.055583 .0415203 1.38 0.169 .9772627 1.140181

sp75\_213\_1lag | .433628 .2223948 -1.63 0.103 .1586944 1.184876

sp75\_343\_1lag | 2.382156 2.506339 0.82 0.409 .302967 18.73032

sp75\_373\_1lag | 1.043843 .8562225 0.05 0.958 .2091357 5.210048

sp75\_503\_1lag | 1.026024 .0112713 2.34 0.019 1.004168 1.048355

sp75\_523\_1lag | .9066039 .066959 -1.33 0.184 .7844233 1.047815

sp75\_523\_3\_1lag | 1.008399 .0281883 0.30 0.765 .9546372 1.065189

sp75\_603\_1lag | 1.049389 .1857656 0.27 0.785 .7417447 1.484631

sp75\_703\_3\_1lag | 1.113455 .1849442 0.65 0.518 .8040601 1.541902

sp48\_24\_1lag | 1 (omitted)

sp48\_4\_1lag | .3553104 .457809 -0.80 0.422 .0284351 4.439774

sp75\_1404\_1lag | .3387925 .1405261 -2.61 0.009 .1502685 .763835

sp75\_1719\_4\_1lag | 1.116153 .1590655 0.77 0.441 .8441455 1.47581

sp75\_204\_1lag | 1.120376 .0677161 1.88 0.060 .9952151 1.261278

sp75\_334\_1lag | 1.07697 .1509857 0.53 0.597 .8182193 1.417548

sp75\_524\_1lag | .539215 .2728325 -1.22 0.222 .2000185 1.453629

sp75\_604\_1lag | 1.047931 .0242943 2.02 0.043 1.001381 1.096645

sp75\_703\_4\_1lag | .2648146 .3254414 -1.08 0.280 .0238158 2.944545

sp48\_25\_1lag | .9781632 .2784817 -0.08 0.938 .5598549 1.70902

sp48\_5\_1lag | 1.39748 .374056 1.25 0.211 .8270071 2.361469

sp75\_1315\_1lag | 1.752019 1.213821 0.81 0.418 .4506252 6.8118

sp75\_1403\_5\_1lag | 1.086196 .085125 1.06 0.291 .9315362 1.266534

sp75\_1405\_1lag | .9635398 .1427244 -0.25 0.802 .7207512 1.288113

sp75\_155\_1lag | 1 (omitted)

sp75\_1725\_1lag | 1.033084 .0229351 1.47 0.143 .9890958 1.079028

sp75\_205\_1lag | 1.849362 .8312771 1.37 0.171 .7663229 4.463052

sp75\_215\_1lag | .5419319 .5638483 -0.59 0.556 .0705212 4.164567

sp75\_505\_1lag | 1.134115 .3992473 0.36 0.721 .5688594 2.261045

sp75\_605\_1lag | .9239684 .0535197 -1.37 0.172 .824807 1.035051

sp48\_26\_1lag | 1.098765 .1657856 0.62 0.532 .8174709 1.476852

sp48\_6\_1lag | .8022986 .1196097 -1.48 0.140 .5990123 1.074574

sp75\_1316\_1lag | .8448176 .4645597 -0.31 0.759 .2875364 2.482179

sp75\_1403\_6\_1lag | 1.092499 .0776919 1.24 0.213 .9503612 1.255895

sp75\_156\_1lag | .8243727 .6953236 -0.23 0.819 .1578233 4.306021

sp75\_1906\_1lag | 2.280485 .8160202 2.30 0.021 1.130952 4.59844

sp75\_1916\_1lag | 1.228454 .512573 0.49 0.622 .542244 2.783064

sp75\_606\_1lag | 1.01868 .0358446 0.53 0.599 .9507938 1.091414

sp75\_816\_1lag | 1.04137 .1071014 0.39 0.693 .8512595 1.273938

sp75\_906\_1lag | .5716854 .211105 -1.51 0.130 .2772272 1.178904

sp48\_27\_1lag | 1.164283 .267306 0.66 0.508 .742391 1.825932

sp48\_7\_1lag | 1.52994 .328344 1.98 0.048 1.004607 2.329983

sp75\_1403\_7\_1lag | .9117533 .1984721 -0.42 0.671 .5950949 1.39691

sp75\_207\_1lag | 1.250855 .410015 0.68 0.495 .6579512 2.378047

sp75\_327\_1lag | 1 (omitted)

sp75\_337\_1lag | 1.079136 .1745774 0.47 0.638 .7859102 1.481766

sp75\_507\_1lag | 1.111359 .2244265 0.52 0.601 .7481069 1.650992

sp75\_607\_1lag | .9839739 .1524105 -0.10 0.917 .7263377 1.332995

sp75\_807\_1lag | 1.103846 .0468426 2.33 0.020 1.01575 1.199582

sp75\_817\_1lag | .1964179 .1609888 -1.99 0.047 .0394018 .9791427

sp48\_28\_1lag | 1.012427 .1872176 0.07 0.947 .704628 1.454681

sp48\_8\_1lag | 1.20634 .2523147 0.90 0.370 .8006351 1.817626

sp75\_1318\_1lag | .8109326 1.172797 -0.14 0.885 .0476375 13.80448

sp75\_1403\_8\_1lag | .8487537 .0579869 -2.40 0.016 .7423822 .9703666

sp75\_208\_1lag | .9119161 .0434325 -1.94 0.053 .8306425 1.001142

sp75\_388\_1lag | 1.047048 .1322368 0.36 0.716 .8174556 1.341124

sp75\_209\_1lag | .9786162 .1175294 -0.18 0.857 .7733662 1.238339

sp75\_389\_1lag | .9086475 .3653312 -0.24 0.812 .4132007 1.998158

sp75\_509\_1lag | .8315686 .3100793 -0.49 0.621 .4004036 1.727023

sp75\_100\_1lag | 2.216448 1.248694 1.41 0.158 .7347012 6.686585

sp75\_1400\_1lag | 1.042594 .2064004 0.21 0.833 .7073017 1.536831

sp75\_1403\_10\_1lag | 1.301257 .1359468 2.52 0.012 1.060316 1.596949

sp75\_160\_1lag | 1.618481 .9362986 0.83 0.405 .520815 5.029578

sp75\_1720\_1lag | 1.009919 .1003195 0.10 0.921 .831253 1.226987

sp75\_340\_1lag | 1.09551 .0643694 1.55 0.121 .9763413 1.229223

sp75\_500\_1lag | 1.122073 .1710773 0.76 0.450 .8322277 1.512864

sp75\_510\_1lag | 1 (omitted)

sp75\_810\_1lag | .8810757 .0966311 -1.15 0.248 .7106545 1.092365

mine\_time | 1.001969 .0024111 0.82 0.414 .9972545 1.006706

onsite\_insp\_hours | 1.003812 .0004401 8.68 0.000 1.00295 1.004675

|

state |

AL | 1.178506 .4143114 0.47 0.640 .5916795 2.347347

AR | 2.108759 .1588865 9.90 0.000 1.81925 2.444339

CO | 1.663201 .2750694 3.08 0.002 1.202731 2.299965

IL | 3.517998 1.152022 3.84 0.000 1.85164 6.68397

IN | 1.493739 .2967195 2.02 0.043 1.012023 2.204749

MD | 1.625908 .3386104 2.33 0.020 1.080999 2.445493

MT | .4563026 .0371501 -9.64 0.000 .3890022 .5352466

NM | 2.515856 .1554103 14.94 0.000 2.228974 2.839661

OH | 1.359492 .2738489 1.52 0.127 .9160414 2.017614

OK | 3.773337 1.58454 3.16 0.002 1.656838 8.593522

PA | 1.68901 .1870776 4.73 0.000 1.359413 2.098518

TN | 2.257731 .4467669 4.12 0.000 1.531912 3.327443

UT | .4718239 .1397386 -2.54 0.011 .2640476 .8430972

VA | 1.076905 .0809679 0.99 0.324 .9293497 1.247888

WV | 1.710243 .1185013 7.74 0.000 1.493065 1.959011

WY | 2.317333 .4612251 4.22 0.000 1.568814 3.422988

|

time |

2000.25 | 1.3842 .206579 2.18 0.029 1.033154 1.854526

2000.5 | 1.352543 .2072524 1.97 0.049 1.001659 1.826342

2000.75 | .7095208 .0978172 -2.49 0.013 .541521 .9296405

2001 | .8021748 .1154758 -1.53 0.126 .6049725 1.063659

2001.25 | .9609416 .1337219 -0.29 0.775 .7315538 1.262257

2001.75 | .8599552 .1173702 -1.11 0.269 .6581129 1.123702

2002 | .8422968 .1217934 -1.19 0.235 .6344307 1.118269

2002.25 | .6876469 .098901 -2.60 0.009 .5187298 .9115694

2002.5 | 1.058431 .1611883 0.37 0.709 .7852956 1.426566

2002.75 | .6831209 .1015263 -2.56 0.010 .5104943 .9141223

2003 | .7301709 .1123524 -2.04 0.041 .5400686 .9871884

2003.25 | .7840444 .1241382 -1.54 0.124 .5748697 1.06933

2003.5 | 1.230098 .203696 1.25 0.211 .8891734 1.701739

2003.75 | .6351492 .0990781 -2.91 0.004 .4678377 .8622957

2004 | .6707603 .1019861 -2.63 0.009 .4979044 .903626

2004.25 | .5843284 .0890414 -3.53 0.000 .4334597 .787708

2004.5 | .7094263 .1080818 -2.25 0.024 .526291 .9562878

2004.75 | .5158185 .0771949 -4.42 0.000 .3846893 .6916456

2005 | .5570349 .0852823 -3.82 0.000 .4126321 .751972

2005.25 | .5867915 .0880227 -3.55 0.000 .4373185 .7873535

2005.5 | .6426395 .0960943 -2.96 0.003 .4793875 .8614858

2005.75 | .4288989 .0647701 -5.61 0.000 .3190149 .5766324

2006 | .5953651 .0923298 -3.34 0.001 .4393172 .8068421

2006.25 | .5462944 .0837362 -3.94 0.000 .4045333 .737733

2006.5 | .5952508 .0901581 -3.43 0.001 .4423592 .800986

2006.75 | .5112008 .0811253 -4.23 0.000 .3745498 .6977075

2007 | .4290737 .0663756 -5.47 0.000 .3168511 .5810434

2007.25 | .4966757 .0771354 -4.51 0.000 .366335 .6733912

2007.5 | .549886 .086763 -3.79 0.000 .4036147 .7491665

2007.75 | .3944544 .0622289 -5.90 0.000 .2895421 .5373804

2008 | .4059837 .0655168 -5.59 0.000 .2958991 .5570237

2008.25 | .393765 .0634385 -5.78 0.000 .2871457 .539973

2008.5 | .3725865 .0587956 -6.26 0.000 .2734665 .5076331

2008.75 | .351775 .0551124 -6.67 0.000 .2587663 .4782139

2009 | .413722 .0679204 -5.38 0.000 .2998938 .570755

2009.25 | .3679295 .0618019 -5.95 0.000 .2647199 .5113788

2009.5 | .3759933 .0627452 -5.86 0.000 .2711022 .5214676

2009.75 | .3192439 .053564 -6.81 0.000 .229776 .4435478

2010 | .3709295 .063748 -5.77 0.000 .2648523 .5194921

2010.25 | .3341861 .0571162 -6.41 0.000 .2390608 .467163

2010.5 | .4965022 .0846984 -4.10 0.000 .3553976 .69363

2010.75 | .305199 .0519485 -6.97 0.000 .2186243 .426057

2011 | .3458194 .0594831 -6.17 0.000 .2468524 .4844639

2011.25 | .3961721 .0693373 -5.29 0.000 .2811307 .5582897

2011.5 | .4848295 .0802112 -4.38 0.000 .3505617 .670523

2011.75 | .3211778 .054016 -6.75 0.000 .2309881 .4465824

2012 | .3427155 .0578268 -6.35 0.000 .2462121 .4770435

2012.25 | .3755626 .0643744 -5.71 0.000 .2683981 .525515

2012.5 | .3302466 .0595737 -6.14 0.000 .2318937 .470314

2012.75 | .1718422 .0316553 -9.56 0.000 .1197648 .2465646

2013 | .2874141 .0532456 -6.73 0.000 .1999017 .4132374

2013.25 | .2917204 .0537972 -6.68 0.000 .2032328 .4187356

2013.5 | .2986471 .0571771 -6.31 0.000 .2052072 .4346343

2013.75 | .2057809 .0404845 -8.04 0.000 .1399404 .3025986

2014 | .2261537 .0472702 -7.11 0.000 .1501368 .3406593

2014.25 | .2179812 .0431043 -7.70 0.000 .1479448 .3211726

2014.5 | .2579689 .0528604 -6.61 0.000 .1726424 .3854669

2014.75 | .2846965 .0580882 -6.16 0.000 .1908564 .4246759

2015 | .2270257 .0459214 -7.33 0.000 .1527212 .3374822

2015.25 | .1900205 .039847 -7.92 0.000 .125981 .2866132

2015.5 | .3280183 .068131 -5.37 0.000 .218323 .4928295

2015.75 | .2006955 .0433342 -7.44 0.000 .1314457 .3064285

2016 | .1350186 .0325901 -8.30 0.000 .084127 .2166965

|

\_cons | .000082 9.34e-06 -82.63 0.000 .0000656 .0001025

lnhours | 1 (offset)

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

Note: 0 failures and 2 successes completely determined.

(est1 stored)

**. lfit**

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

number of observations = 26060

number of covariate patterns = 26044

Pearson chi2(25879) = 78844.40

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -17519.45

Iteration 1: log likelihood = -12940.011

Iteration 2: log likelihood = -12472.651

Iteration 3: log likelihood = -12408.891

Iteration 4: log likelihood = -12406.775

Iteration 5: log likelihood = -12406.772

Iteration 6: log likelihood = -12406.772

Logistic regression Number of obs = 26,060

LR chi2(2) = 10225.36

Prob > chi2 = 0.0000

Log likelihood = -12406.772 Pseudo R2 = 0.2918

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

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

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

\_hat | .989048 .0142332 69.49 0.000 .9611514 1.016945

\_hatsq | .1268803 .0047842 26.52 0.000 .1175034 .1362572

\_cons | -.1593983 .0170806 -9.33 0.000 -.1928757 -.1259209

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

Note: 0 failures and 55 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 13225 3548 | 16773

- | 2458 6829 | 9287

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

Total | 15683 10377 | 26060

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

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

Sensitivity Pr( +| D) 84.33%

Specificity Pr( -|~D) 65.81%

Positive predictive value Pr( D| +) 78.85%

Negative predictive value Pr(~D| -) 73.53%

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

False + rate for true ~D Pr( +|~D) 34.19%

False - rate for true D Pr( -| D) 15.67%

False + rate for classified + Pr(~D| +) 21.15%

False - rate for classified - Pr( D| -) 26.47%

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

Correctly classified 76.95%

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

**. summ dv\_indicator bv2\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bv2\_yhat | 26,060 .6018035 .2815752 .0001864 1