. // Model PS.Q.B.SP.V.1

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

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

sp75\_1405\_1 dropped and 5 obs not used

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

sp75\_500\_1 dropped and 7 obs not used

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

sp75\_508\_1 dropped and 4 obs not used

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

sp75\_1003\_2 dropped and 30 obs not used

note: sp75\_1322 != 0 predicts success perfectly

sp75\_1322 dropped and 2 obs not used

note: sp48\_24 != 0 predicts success perfectly

sp48\_24 dropped and 1 obs not used

note: sp75\_703\_4 != 0 predicts failure perfectly

sp75\_703\_4 dropped and 4 obs not used

note: sp75\_155 != 0 predicts success perfectly

sp75\_155 dropped and 3 obs not used

note: sp75\_327 != 0 predicts success perfectly

sp75\_327 dropped and 2 obs not used

note: sp75\_510 != 0 predicts success perfectly

sp75\_510 dropped and 2 obs not used

Iteration 0: log pseudolikelihood = -14550.007

Iteration 1: log pseudolikelihood = -13841.169

Iteration 2: log pseudolikelihood = -13799.084

Iteration 3: log pseudolikelihood = -13798.182

Iteration 4: log pseudolikelihood = -13798.178

Iteration 5: log pseudolikelihood = -13798.178

Logistic regression Number of obs = 28,277

Wald chi2(160) = .

Log pseudolikelihood = -13798.178 Prob > chi2 = .

(Std. Err. adjusted for 1,544 clusters in mineid)

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

| Robust

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

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

sp48\_11 | 1.089452 .191199 0.49 0.625 .772364 1.536718

sp75\_1311 | .4975435 .1719968 -2.02 0.043 .2526839 .9796807

sp75\_1400\_1 | .2577331 .2740471 -1.28 0.202 .0320693 2.071339

sp75\_1404\_1 | 3.042418 2.379953 1.42 0.155 .65669 14.0954

sp75\_1405\_1 | 1 (omitted)

sp75\_500\_1 | 1 (omitted)

sp75\_501 | 1.132572 .285278 0.49 0.621 .6912905 1.855542

sp75\_506\_1 | 1.026412 .2558709 0.10 0.917 .6296923 1.673073

sp75\_507\_1 | 1.058072 .0857928 0.70 0.486 .9026021 1.240321

sp75\_508\_1 | 1 (omitted)

sp75\_512\_1 | .4980335 .3593395 -0.97 0.334 .1210884 2.048399

sp75\_811 | .823419 .1313382 -1.22 0.223 .6023533 1.125616

sp75\_1002 | .8444858 .0857806 -1.66 0.096 .6920374 1.030517

sp75\_1003\_2 | 1 (omitted)

sp75\_1322 | 1 (omitted)

sp75\_1719\_2 | .5817602 .2353239 -1.34 0.181 .2632875 1.285458

sp75\_212 | 1.252199 .2820766 1.00 0.318 .8052442 1.947239

sp75\_332 | .79832 .1870813 -0.96 0.336 .5043167 1.26372

sp75\_501\_2 | .8994858 .1927998 -0.49 0.621 .5909408 1.36913

sp75\_502 | 1.437185 .6487565 0.80 0.422 .5932993 3.481382

sp75\_602 | 1.08349 .1305991 0.67 0.506 .8555093 1.372224

sp75\_812 | .3763929 .1954103 -1.88 0.060 .1360589 1.041252

sp75\_1003 | .8142713 .2255829 -0.74 0.458 .4731024 1.401468

sp75\_153 | 1.07232 1.958832 0.04 0.970 .0298823 38.47993

sp75\_203 | .9936222 .0368639 -0.17 0.863 .9239346 1.068566

sp75\_213 | 2.721893 1.922801 1.42 0.156 .6816552 10.86869

sp75\_343 | 1.459942 .7473452 0.74 0.460 .5353097 3.981679

sp75\_373 | 1.277359 1.097926 0.28 0.776 .236963 6.885651

sp75\_503 | 1.011665 .0115514 1.02 0.310 .9892758 1.03456

sp75\_523 | .9027943 .0603637 -1.53 0.126 .791908 1.029207

sp75\_523\_3 | .9575385 .024877 -1.67 0.095 .9100011 1.007559

sp75\_603 | 1.222795 .2169169 1.13 0.257 .8636851 1.731219

sp75\_703\_3 | .8733158 .128849 -0.92 0.359 .6540111 1.166158

sp48\_24 | 1 (omitted)

sp48\_4 | 1.184033 1.17028 0.17 0.864 .1706276 8.216343

sp75\_1404 | .5747386 .5001124 -0.64 0.524 .104422 3.16336

sp75\_1719\_4 | 1.074447 .1634489 0.47 0.637 .7974379 1.447681

sp75\_204 | 1.138863 .0650824 2.28 0.023 1.018188 1.27384

sp75\_334 | 1.031975 .1238329 0.26 0.793 .815696 1.305599

sp75\_524 | 1.364237 .7360856 0.58 0.565 .4738238 3.927922

sp75\_604 | 1.061678 .0234462 2.71 0.007 1.016704 1.10864

sp75\_703\_4 | 1 (omitted)

sp48\_25 | 1.027794 .2846644 0.10 0.921 .5972441 1.768725

sp48\_5 | 1.30791 .4370586 0.80 0.422 .6794152 2.517794

sp75\_1315 | 1.098544 .9376077 0.11 0.912 .2062131 5.85219

sp75\_1403\_5 | 1.125384 .1194044 1.11 0.266 .9140866 1.385524

sp75\_1405 | 1.080343 .1855921 0.45 0.653 .771496 1.512828

sp75\_155 | 1 (omitted)

sp75\_1725 | 1.043086 .0213768 2.06 0.040 1.002018 1.085837

sp75\_205 | 1.033721 .4186229 0.08 0.935 .4674063 2.286188

sp75\_215 | .1944943 .1482888 -2.15 0.032 .0436438 .8667441

sp75\_505 | 1.623678 .6648061 1.18 0.236 .7277461 3.622594

sp75\_605 | 1.111456 .0652312 1.80 0.072 .9906846 1.24695

sp48\_26 | 1.053093 .1516787 0.36 0.719 .7940849 1.396583

sp48\_6 | 1.007173 .1269302 0.06 0.955 .7867381 1.28937

sp75\_1316 | .5110482 .2135825 -1.61 0.108 .2252781 1.159324

sp75\_1403\_6 | 1.148386 .0842707 1.89 0.059 .9945466 1.326022

sp75\_156 | .8873476 .7298724 -0.15 0.884 .1769916 4.448718

sp75\_1906 | 1.304771 .3102132 1.12 0.263 .8187637 2.079266

sp75\_1916 | 1.471608 .5119217 1.11 0.267 .7441976 2.910019

sp75\_606 | .9902425 .0371467 -0.26 0.794 .9200484 1.065792

sp75\_816 | .7982204 .0827758 -2.17 0.030 .6514076 .9781215

sp75\_906 | .9143902 .4237508 -0.19 0.847 .3686922 2.267771

sp48\_27 | 1.04658 .2381682 0.20 0.841 .6699866 1.634853

sp48\_7 | 1.975571 .4098875 3.28 0.001 1.315488 2.966868

sp75\_1403\_7 | .5703817 .1508944 -2.12 0.034 .3396099 .9579676

sp75\_207 | 1.129702 .3238697 0.43 0.671 .6440749 1.981488

sp75\_327 | 1 (omitted)

sp75\_337 | .9803215 .1407655 -0.14 0.890 .7398496 1.298953

sp75\_507 | 1.045684 .1598575 0.29 0.770 .7749511 1.410999

sp75\_607 | .8017961 .11194 -1.58 0.114 .6098547 1.054148

sp75\_807 | 1.06686 .0400796 1.72 0.085 .9911274 1.148378

sp75\_817 | 1.23743 .9379902 0.28 0.779 .2800898 5.466936

sp48\_28 | .8280025 .1619819 -0.96 0.335 .5643016 1.214932

sp48\_8 | 1.370744 .3238754 1.33 0.182 .862655 2.17809

sp75\_1318 | 4.561794 6.809389 1.02 0.309 .2446512 85.05974

sp75\_1403\_8 | 1.001074 .1713432 0.01 0.995 .7157724 1.400094

sp75\_208 | 1.034607 .0515804 0.68 0.495 .9382933 1.140807

sp75\_388 | 1.252361 .1976276 1.43 0.154 .9191922 1.706288

sp75\_209 | .8565325 .1095882 -1.21 0.226 .6665577 1.100652

sp75\_389 | .7736436 .2660395 -0.75 0.455 .3943038 1.517927

sp75\_509 | 2.181044 1.073173 1.58 0.113 .8314471 5.721295

sp75\_100 | 3.810218 2.314245 2.20 0.028 1.15864 12.53001

sp75\_1400 | .8039018 .1866339 -0.94 0.347 .5100209 1.267121

sp75\_1403\_10 | 1.308289 .1619608 2.17 0.030 1.026428 1.66755

sp75\_160 | .8636927 .4556233 -0.28 0.781 .3071322 2.428808

sp75\_1720 | 1.113634 .1019498 1.18 0.240 .9307172 1.332501

sp75\_340 | 1.098761 .0621197 1.67 0.096 .9835122 1.227515

sp75\_500 | .9261964 .1238066 -0.57 0.566 .7127237 1.203608

sp75\_510 | 1 (omitted)

sp75\_810 | .8281987 .1003844 -1.56 0.120 .6530735 1.050285

mine\_time | 1.003177 .0023436 1.36 0.175 .9985944 1.007781

onsite\_insp\_hours | 1.003922 .0004795 8.19 0.000 1.002983 1.004862

|

state |

AL | 1.152576 .4111273 0.40 0.691 .5728529 2.318973

AR | 1.78915 .1401376 7.43 0.000 1.53453 2.086019

CO | 1.688235 .2781017 3.18 0.001 1.222405 2.331582

IL | 3.501368 1.025003 4.28 0.000 1.972668 6.21472

IN | 1.590602 .3030416 2.44 0.015 1.094941 2.310641

MD | 1.547376 .3244604 2.08 0.037 1.025917 2.333885

MT | .4275427 .0301617 -12.04 0.000 .3723318 .4909404

NM | 2.269538 .1398218 13.30 0.000 2.011391 2.560815

OH | 1.390414 .2602845 1.76 0.078 .9633846 2.006727

OK | 3.649399 1.499169 3.15 0.002 1.631356 8.163832

PA | 1.651513 .1771112 4.68 0.000 1.338436 2.037822

TN | 2.242661 .3920322 4.62 0.000 1.592091 3.159071

UT | .4844802 .1363341 -2.58 0.010 .2790909 .8410204

VA | 1.101432 .0801607 1.33 0.184 .9550107 1.270301

WV | 1.71181 .1147119 8.02 0.000 1.501118 1.952074

WY | 2.664448 .6290617 4.15 0.000 1.677425 4.23225

|

time |

2000 | .9379773 .1280184 -0.47 0.639 .7178231 1.225652

2000.25 | 1.34641 .188667 2.12 0.034 1.023061 1.771955

2000.5 | 1.410951 .1951644 2.49 0.013 1.075902 1.850338

2000.75 | .7491452 .0974425 -2.22 0.026 .5805623 .9666809

2001 | .8252422 .1106005 -1.43 0.152 .6346025 1.073152

2001.5 | 1.047729 .1384561 0.35 0.724 .8086563 1.357483

2001.75 | .8589169 .1159163 -1.13 0.260 .6592893 1.11899

2002 | .9070762 .1317341 -0.67 0.502 .682377 1.205767

2002.25 | .7215107 .1034182 -2.28 0.023 .5447977 .955543

2002.5 | 1.031929 .1503704 0.22 0.829 .7755587 1.373046

2002.75 | .7352836 .1079727 -2.09 0.036 .5513917 .9805044

2003 | .7542357 .1126798 -1.89 0.059 .562783 1.010819

2003.25 | .8406795 .1322789 -1.10 0.270 .6175839 1.144366

2003.5 | 1.238561 .1931387 1.37 0.170 .9123949 1.681327

2003.75 | .6464236 .0979268 -2.88 0.004 .480362 .869893

2004 | .6865786 .1028358 -2.51 0.012 .5119142 .9208382

2004.25 | .6511799 .0947475 -2.95 0.003 .4896098 .8660678

2004.5 | .7260824 .1080078 -2.15 0.031 .542458 .9718644

2004.75 | .5430653 .078567 -4.22 0.000 .4089837 .7211044

2005 | .5731636 .0850909 -3.75 0.000 .4284603 .7667373

2005.25 | .6114527 .0923075 -3.26 0.001 .4548434 .8219851

2005.5 | .6664105 .0969159 -2.79 0.005 .5011317 .8862002

2005.75 | .4630598 .0682403 -5.22 0.000 .3468943 .6181261

2006 | .6163579 .0947992 -3.15 0.002 .4559462 .833206

2006.25 | .5366383 .0800629 -4.17 0.000 .4005789 .7189113

2006.5 | .6217569 .0916595 -3.22 0.001 .4657323 .8300511

2006.75 | .5383536 .0837385 -3.98 0.000 .3968871 .7302444

2007 | .4606835 .0697511 -5.12 0.000 .3423924 .6198424

2007.25 | .4914041 .0740221 -4.72 0.000 .3657792 .6601742

2007.5 | .5478595 .0840565 -3.92 0.000 .4055756 .7400595

2007.75 | .4115637 .0625994 -5.84 0.000 .3054696 .5545057

2008 | .4321573 .0683865 -5.30 0.000 .3169158 .5893045

2008.25 | .4460814 .070771 -5.09 0.000 .3268666 .608776

2008.5 | .4113505 .06276 -5.82 0.000 .3050308 .5547284

2008.75 | .369909 .0565502 -6.51 0.000 .2741363 .499141

2009 | .4084957 .0642222 -5.69 0.000 .3001682 .5559174

2009.25 | .4240791 .0702094 -5.18 0.000 .3065661 .5866371

2009.5 | .3977766 .0651089 -5.63 0.000 .2886109 .5482338

2009.75 | .3409112 .0555138 -6.61 0.000 .2477605 .4690839

2010 | .4001092 .0679954 -5.39 0.000 .2867633 .5582562

2010.25 | .3716136 .0596849 -6.16 0.000 .2712564 .5091001

2010.5 | .5257335 .0879777 -3.84 0.000 .3787244 .7298071

2010.75 | .3237569 .0538477 -6.78 0.000 .2336932 .4485305

2011 | .3612625 .0601313 -6.12 0.000 .2607008 .5006145

2011.25 | .424338 .0727717 -5.00 0.000 .3032043 .593866

2011.5 | .5022637 .0825858 -4.19 0.000 .3638908 .6932542

2011.75 | .3412066 .0571991 -6.41 0.000 .2456541 .4739265

2012 | .3543456 .058713 -6.26 0.000 .2560872 .4903048

2012.25 | .3811077 .0624122 -5.89 0.000 .2764716 .5253456

2012.5 | .3381206 .0600893 -6.10 0.000 .2386711 .4790088

2012.75 | .1779067 .0318424 -9.65 0.000 .1252683 .252664

2013 | .2908274 .0527024 -6.82 0.000 .2038847 .4148452

2013.25 | .304799 .0550214 -6.58 0.000 .2139721 .43418

2013.5 | .3199911 .0607326 -6.00 0.000 .2205893 .4641852

2013.75 | .2157713 .0416867 -7.94 0.000 .1477551 .3150973

2014 | .2283045 .0463616 -7.27 0.000 .1533422 .3399126

2014.25 | .221946 .0431416 -7.74 0.000 .1516323 .324865

2014.5 | .2560207 .0509192 -6.85 0.000 .1733733 .3780663

2014.75 | .2914252 .0586586 -6.13 0.000 .1964246 .4323729

2015 | .2497896 .0504592 -6.87 0.000 .1681225 .3711273

2015.25 | .1934255 .039148 -8.12 0.000 .1300877 .2876016

2015.5 | .3404761 .069426 -5.28 0.000 .2283071 .5077546

2015.75 | .218704 .046166 -7.20 0.000 .144603 .3307776

2016 | .1385033 .034037 -8.04 0.000 .0855615 .2242033

|

\_cons | .0000767 8.33e-06 -87.33 0.000 .000062 .0000949

lnhours | 1 (offset)

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

Note: 0 failures and 1 success completely determined.

(est1 stored)

**. lfit**

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

number of observations = 28277

number of covariate patterns = 28222

Pearson chi2(28058) = 98867.81

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -19230.998

Iteration 1: log likelihood = -14050.474

Iteration 2: log likelihood = -14038.7

Iteration 3: log likelihood = -13485.752

Iteration 4: log likelihood = -13465.959

Iteration 5: log likelihood = -13465.795

Iteration 6: log likelihood = -13465.795

Logistic regression Number of obs = 28,277

LR chi2(2) = 11530.41

Prob > chi2 = 0.0000

Log likelihood = -13465.795 Pseudo R2 = 0.2998

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

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

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

\_hat | 1.009985 .0137388 73.51 0.000 .9830575 1.036913

\_hatsq | .1299989 .004295 30.27 0.000 .1215809 .1384169

\_cons | -.1719753 .0162413 -10.59 0.000 -.2038077 -.140143

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

Note: 0 failures and 56 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 13591 3722 | 17313

- | 2827 8137 | 10964

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

Total | 16418 11859 | 28277

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

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

Sensitivity Pr( +| D) 82.78%

Specificity Pr( -|~D) 68.61%

Positive predictive value Pr( D| +) 78.50%

Negative predictive value Pr(~D| -) 74.22%

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

False + rate for true ~D Pr( +|~D) 31.39%

False - rate for true D Pr( -| D) 17.22%

False + rate for classified + Pr(~D| +) 21.50%

False - rate for classified - Pr( D| -) 25.78%

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

Correctly classified 76.84%

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

**. summ dv\_indicator bv1\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bv1\_yhat | 28,277 .5806132 .2888089 .0000849 1