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

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

note: sp48\_4\_ss != 0 predicts success perfectly

sp48\_4\_ss dropped and 2 obs not used

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

sp75\_1003\_2\_ss dropped and 10 obs not used

note: sp75\_1318\_ss != 0 predicts success perfectly

sp75\_1318\_ss dropped and 2 obs not used

note: sp75\_1404\_ss != 0 predicts success perfectly

sp75\_1404\_ss dropped and 3 obs not used

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

sp75\_1405\_1\_ss dropped and 3 obs not used

note: sp75\_153\_ss != 0 predicts success perfectly

sp75\_153\_ss dropped and 1 obs not used

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

sp75\_155\_ss dropped and 1 obs not used

note: sp75\_156\_ss != 0 predicts success perfectly

sp75\_156\_ss dropped and 1 obs not used

note: sp75\_1906\_ss != 0 predicts success perfectly

sp75\_1906\_ss dropped and 5 obs not used

note: sp75\_373\_ss != 0 predicts failure perfectly

sp75\_373\_ss dropped and 2 obs not used

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

sp75\_500\_1\_ss dropped and 2 obs not used

note: sp75\_524\_ss != 0 predicts success perfectly

sp75\_524\_ss dropped and 8 obs not used

note: sp75\_817\_ss != 0 predicts success perfectly

sp75\_817\_ss dropped and 4 obs not used

note: sp75\_1322\_ss omitted because of collinearity

Iteration 0: log pseudolikelihood = -14551.161

Iteration 1: log pseudolikelihood = -13846.853

Iteration 2: log pseudolikelihood = -13804.076

Iteration 3: log pseudolikelihood = -13803.102

Iteration 4: log pseudolikelihood = -13803.097

Iteration 5: log pseudolikelihood = -13803.097

Logistic regression Number of obs = 28,293

Wald chi2(150) = .

Log pseudolikelihood = -13803.097 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\_ss | 1.50201 .4152082 1.47 0.141 .8737173 2.58211

sp48\_25\_ss | 1.025637 .2989993 0.09 0.931 .5792245 1.816104

sp48\_26\_ss | 1.363979 .27985 1.51 0.130 .912358 2.039155

sp48\_27\_ss | .7186617 .1889114 -1.26 0.209 .4293119 1.203029

sp48\_28\_ss | .864385 .2623551 -0.48 0.631 .4768189 1.566971

sp48\_4\_ss | 1 (omitted)

sp48\_5\_ss | 1.490769 .6199291 0.96 0.337 .6598458 3.368049

sp48\_6\_ss | .9667853 .19686 -0.17 0.868 .6486428 1.440968

sp48\_7\_ss | 2.061874 .5672011 2.63 0.009 1.202555 3.535242

sp48\_8\_ss | 1.759939 .7041549 1.41 0.158 .8033968 3.85536

sp75\_100\_ss | 4.731426 3.904765 1.88 0.060 .9386638 23.84922

sp75\_1002\_ss | .8334422 .2629387 -0.58 0.564 .4490906 1.546739

sp75\_1003\_ss | .9635067 .2741613 -0.13 0.896 .5516319 1.682907

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

sp75\_1311\_ss | .4563687 .2701018 -1.33 0.185 .1430646 1.455792

sp75\_1315\_ss | 1.145877 1.06338 0.15 0.883 .1858737 7.064117

sp75\_1316\_ss | .3720082 .1437507 -2.56 0.010 .1744347 .7933633

sp75\_1318\_ss | 1 (omitted)

sp75\_1322\_ss | 1 (omitted)

sp75\_1400\_ss | 2.609409 1.695473 1.48 0.140 .7302488 9.324242

sp75\_1400\_1\_ss | .1151191 .1108512 -2.25 0.025 .0174383 .7599613

sp75\_1403\_10\_ss | 2.233641 .7087669 2.53 0.011 1.199264 4.160179

sp75\_1403\_5\_ss | 1.238001 .1617399 1.63 0.102 .9583301 1.59929

sp75\_1403\_6\_ss | 1.181256 .1166088 1.69 0.092 .9734569 1.433412

sp75\_1403\_7\_ss | .6765909 .2264699 -1.17 0.243 .3510834 1.303893

sp75\_1403\_8\_ss | .9922409 .2289872 -0.03 0.973 .631217 1.559752

sp75\_1404\_ss | 1 (omitted)

sp75\_1404\_1\_ss | 1.571766 1.033905 0.69 0.492 .4329815 5.70567

sp75\_1405\_ss | 1.159202 .2452821 0.70 0.485 .7656822 1.75497

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

sp75\_153\_ss | 1 (omitted)

sp75\_155\_ss | 1 (omitted)

sp75\_156\_ss | 1 (omitted)

sp75\_1719\_2\_ss | .0607305 .0521789 -3.26 0.001 .0112737 .3271509

sp75\_1719\_4\_ss | .8721611 .272012 -0.44 0.661 .4732838 1.607207

sp75\_1720\_ss | 1.089894 .1075598 0.87 0.383 .8982154 1.322476

sp75\_1725\_ss | 1.029351 .0234211 1.27 0.204 .9844551 1.076295

sp75\_1906\_ss | 1 (omitted)

sp75\_1916\_ss | 1.422039 .7357788 0.68 0.496 .5158108 3.920421

sp75\_203\_ss | .9991582 .0506453 -0.02 0.987 .9046665 1.103519

sp75\_204\_ss | 1.331989 .1447853 2.64 0.008 1.076406 1.648257

sp75\_205\_ss | 1.777187 1.250305 0.82 0.414 .4475969 7.056336

sp75\_207\_ss | 1.905395 1.050637 1.17 0.242 .6465937 5.614854

sp75\_208\_ss | 1.065401 .063675 1.06 0.289 .9476328 1.197805

sp75\_209\_ss | 1.078148 .1894123 0.43 0.668 .7640763 1.521318

sp75\_212\_ss | .7813879 .1672401 -1.15 0.249 .5136702 1.188636

sp75\_213\_ss | 3.407378 3.200541 1.31 0.192 .5406159 21.47592

sp75\_215\_ss | .0142922 .02394 -2.54 0.011 .0005362 .3809765

sp75\_332\_ss | .7399253 .3041527 -0.73 0.464 .3305933 1.656081

sp75\_334\_ss | .9293381 .1554985 -0.44 0.661 .6694978 1.290026

sp75\_337\_ss | .7390735 .1636328 -1.37 0.172 .478883 1.140633

sp75\_340\_ss | 1.128656 .1164082 1.17 0.241 .9220827 1.381509

sp75\_343\_ss | .6671277 .4458968 -0.61 0.545 .1800033 2.472507

sp75\_373\_ss | 1 (omitted)

sp75\_388\_ss | 1.307184 .2330224 1.50 0.133 .9217199 1.853849

sp75\_389\_ss | 1.10268 .7043216 0.15 0.878 .3153236 3.85605

sp75\_500\_ss | 1.344006 .3788623 1.05 0.294 .7734918 2.335321

sp75\_500\_1\_ss | 1 (omitted)

sp75\_501\_ss | .5057106 .2702335 -1.28 0.202 .1774397 1.441297

sp75\_501\_2\_ss | 1.141826 .6559655 0.23 0.817 .370335 3.520506

sp75\_502\_ss | 2.037505 1.688012 0.86 0.390 .4017016 10.3346

sp75\_503\_ss | 1.07998 .0347099 2.39 0.017 1.014048 1.150198

sp75\_505\_ss | 2.418007 2.027743 1.05 0.292 .4673462 12.51054

sp75\_506\_1\_ss | 2.024877 1.842076 0.78 0.438 .3404409 12.04358

sp75\_507\_ss | 1.002188 .3061646 0.01 0.994 .5506941 1.823846

sp75\_507\_1\_ss | .9119911 .1866905 -0.45 0.653 .6105822 1.362188

sp75\_509\_ss | 3.207205 2.23123 1.68 0.094 .8202606 12.54012

sp75\_512\_1\_ss | .7245891 .5593669 -0.42 0.676 .1595816 3.290036

sp75\_523\_ss | .9066263 .0727048 -1.22 0.222 .7747617 1.060934

sp75\_523\_3\_ss | .9796525 .0415199 -0.49 0.628 .9015631 1.064506

sp75\_524\_ss | 1 (omitted)

sp75\_602\_ss | .7897691 .1549761 -1.20 0.229 .5376122 1.160195

sp75\_603\_ss | 1.143722 .2943418 0.52 0.602 .6906529 1.894004

sp75\_604\_ss | 1.043374 .0306303 1.45 0.148 .9850344 1.105169

sp75\_605\_ss | 1.311841 .1540623 2.31 0.021 1.042116 1.651376

sp75\_606\_ss | 1.004486 .0582884 0.08 0.939 .8964996 1.125479

sp75\_607\_ss | .7300152 .1285268 -1.79 0.074 .5169743 1.030848

sp75\_703\_3\_ss | .6533459 .233446 -1.19 0.234 .3243409 1.316087

sp75\_807\_ss | 1.039253 .0954766 0.42 0.675 .8680029 1.24429

sp75\_810\_ss | 1.236987 .5046937 0.52 0.602 .5559978 2.752057

sp75\_811\_ss | .3031977 .1231636 -2.94 0.003 .1367586 .6721977

sp75\_812\_ss | .2176944 .1320688 -2.51 0.012 .0662901 .7149013

sp75\_816\_ss | 1.021712 .3965465 0.06 0.956 .4774859 2.186233

sp75\_817\_ss | 1 (omitted)

sp75\_906\_ss | .40512 .2181809 -1.68 0.093 .1409813 1.164141

mine\_time | 1.002935 .0023403 1.26 0.209 .998359 1.007533

onsite\_insp\_hours | 1.004175 .0004545 9.21 0.000 1.003285 1.005066

|

state |

AL | 1.164468 .4031683 0.44 0.660 .5907725 2.295277

AR | 1.870827 .1291668 9.07 0.000 1.634047 2.141918

CO | 1.772376 .2924953 3.47 0.001 1.282573 2.449231

IL | 3.588641 1.044635 4.39 0.000 2.028381 6.349076

IN | 1.630366 .3160963 2.52 0.012 1.114946 2.384057

MD | 1.601022 .3329706 2.26 0.024 1.065049 2.406716

MT | .4291606 .0282095 -12.87 0.000 .3772845 .4881697

NM | 2.358999 .1334951 15.17 0.000 2.111341 2.635706

OH | 1.383742 .2518057 1.78 0.074 .9686306 1.976751

OK | 3.627313 1.450819 3.22 0.001 1.656263 7.944029

PA | 1.632566 .1731269 4.62 0.000 1.326186 2.009728

TN | 2.212559 .3819966 4.60 0.000 1.577377 3.103517

UT | .4918689 .1399052 -2.49 0.013 .2816677 .8589377

VA | 1.09995 .0796047 1.32 0.188 .9544885 1.26758

WV | 1.725263 .1156743 8.13 0.000 1.512811 1.967552

WY | 2.908894 .6552543 4.74 0.000 1.870627 4.523437

|

time |

2000 | .9406315 .1279954 -0.45 0.653 .7204324 1.228134

2000.25 | 1.341444 .1882415 2.09 0.036 1.018886 1.766117

2000.5 | 1.403841 .1950206 2.44 0.015 1.069226 1.843174

2000.75 | .7427631 .0965587 -2.29 0.022 .575698 .9583098

2001 | .8167007 .1095161 -1.51 0.131 .6279432 1.062198

2001.5 | 1.052133 .1389346 0.38 0.700 .8122118 1.362926

2001.75 | .8692453 .1170999 -1.04 0.298 .6675337 1.131909

2002 | .8960114 .1299682 -0.76 0.449 .6742875 1.190644

2002.25 | .7221187 .1028163 -2.29 0.022 .5462775 .9545613

2002.5 | 1.042389 .1515283 0.29 0.775 .7839602 1.386009

2002.75 | .7332032 .1072065 -2.12 0.034 .5505091 .9765268

2003 | .7642549 .1146604 -1.79 0.073 .5695519 1.025518

2003.25 | .8394164 .1315582 -1.12 0.264 .6174079 1.141255

2003.5 | 1.226239 .1914595 1.31 0.191 .9029679 1.665244

2003.75 | .6361593 .0961472 -2.99 0.003 .4730618 .8554879

2004 | .6854611 .1028206 -2.52 0.012 .5108588 .9197394

2004.25 | .6517934 .0945649 -2.95 0.003 .4904719 .8661754

2004.5 | .7139775 .1063765 -2.26 0.024 .5331665 .9561064

2004.75 | .5507832 .0795033 -4.13 0.000 .4150622 .7308835

2005 | .5735476 .0847912 -3.76 0.000 .4292703 .7663163

2005.25 | .611568 .0922202 -3.26 0.001 .4550819 .821864

2005.5 | .6657778 .0970129 -2.79 0.005 .5003773 .8858516

2005.75 | .4609375 .0679989 -5.25 0.000 .3451996 .6154799

2006 | .6115716 .0935872 -3.21 0.001 .4530959 .825476

2006.25 | .5369079 .0798089 -4.18 0.000 .4012108 .7185003

2006.5 | .6206655 .0920273 -3.22 0.001 .4641392 .8299786

2006.75 | .5386167 .0830685 -4.01 0.000 .3981097 .7287137

2007 | .4582179 .0691146 -5.17 0.000 .3409435 .6158312

2007.25 | .4936876 .0740758 -4.70 0.000 .3679027 .6624781

2007.5 | .5560634 .0844296 -3.87 0.000 .4129358 .7488004

2007.75 | .4176332 .0634798 -5.74 0.000 .3100368 .5625702

2008 | .440845 .0696623 -5.18 0.000 .3234292 .6008868

2008.25 | .4482768 .0706921 -5.09 0.000 .3290895 .6106305

2008.5 | .4137253 .0630431 -5.79 0.000 .306907 .5577215

2008.75 | .3665729 .0559672 -6.57 0.000 .27177 .4944464

2009 | .4200978 .0653956 -5.57 0.000 .3096321 .5699739

2009.25 | .4283228 .0706019 -5.14 0.000 .3100735 .5916673

2009.5 | .4111841 .0673841 -5.42 0.000 .2982243 .5669303

2009.75 | .3494786 .0570522 -6.44 0.000 .2537829 .481259

2010 | .4031939 .0682811 -5.36 0.000 .2893094 .5619081

2010.25 | .3725616 .0596442 -6.17 0.000 .2722245 .509881

2010.5 | .5354772 .0893089 -3.74 0.000 .3861663 .7425191

2010.75 | .3219965 .0535123 -6.82 0.000 .2324828 .445976

2011 | .3606264 .0599487 -6.14 0.000 .2603503 .4995248

2011.25 | .4274949 .0732517 -4.96 0.000 .305546 .5981159

2011.5 | .5084446 .0833309 -4.13 0.000 .3687543 .7010519

2011.75 | .3438422 .0575077 -6.38 0.000 .2477396 .4772246

2012 | .3572691 .0594119 -6.19 0.000 .2578964 .4949321

2012.25 | .3864693 .0634071 -5.79 0.000 .280195 .5330521

2012.5 | .3471233 .0614081 -5.98 0.000 .2454151 .4909826

2012.75 | .1796827 .0320342 -9.63 0.000 .126693 .2548356

2013 | .2930321 .0530387 -6.78 0.000 .2055171 .4178134

2013.25 | .306241 .0549799 -6.59 0.000 .2154001 .4353924

2013.5 | .3184636 .0602112 -6.05 0.000 .2198494 .4613117

2013.75 | .2191407 .0421681 -7.89 0.000 .1502903 .3195326

2014 | .2306093 .046386 -7.29 0.000 .1554753 .342052

2014.25 | .2242692 .0435686 -7.70 0.000 .1532523 .328195

2014.5 | .2574706 .0512825 -6.81 0.000 .1742557 .3804242

2014.75 | .2981449 .0596003 -6.05 0.000 .2014972 .4411495

2015 | .2497063 .0504839 -6.86 0.000 .1680117 .3711243

2015.25 | .1951134 .0392986 -8.11 0.000 .131475 .2895551

2015.5 | .3378826 .069321 -5.29 0.000 .2260116 .5051274

2015.75 | .2172113 .0462127 -7.18 0.000 .143148 .3295941

2016 | .1392234 .0341722 -8.03 0.000 .086057 .2252362

|

\_cons | .0000765 8.22e-06 -88.25 0.000 .000062 .0000944

lnhours | 1 (offset)

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

(est1 stored)

**. lfit**

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

number of observations = 28293

number of covariate patterns = 28177

Pearson chi2(28023) = 96810.95

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -19240.346

Iteration 1: log likelihood = -14057.163

Iteration 2: log likelihood = -14028.07

Iteration 3: log likelihood = -13493.416

Iteration 4: log likelihood = -13476.143

Iteration 5: log likelihood = -13476.046

Iteration 6: log likelihood = -13476.046

Logistic regression Number of obs = 28,293

LR chi2(2) = 11528.60

Prob > chi2 = 0.0000

Log likelihood = -13476.046 Pseudo R2 = 0.2996

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

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

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

\_hat | 1.013093 .0137768 73.54 0.000 .9860905 1.040095

\_hatsq | .1302254 .004324 30.12 0.000 .1217505 .1387003

\_cons | -.1714579 .0162335 -10.56 0.000 -.2032749 -.1396408

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

Note: 0 failures and 66 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 13625 3741 | 17366

- | 2807 8120 | 10927

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

Total | 16432 11861 | 28293

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

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

Sensitivity Pr( +| D) 82.92%

Specificity Pr( -|~D) 68.46%

Positive predictive value Pr( D| +) 78.46%

Negative predictive value Pr(~D| -) 74.31%

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

False + rate for true ~D Pr( +|~D) 31.54%

False - rate for true D Pr( -| D) 17.08%

False + rate for classified + Pr(~D| +) 21.54%

False - rate for classified - Pr( D| -) 25.69%

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

Correctly classified 76.86%

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

**. summ dv\_indicator bssv1\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bssv1\_yhat | 28,293 .5807797 .2882072 .0000847 .9999998