. // Model PS.Q.B.SP.V.3

**. eststo: logit dv\_indicator `count\_lag\_4\_vars' `covariates' ib(freq).state ib(freq).time, vce(cl mineid) offset(lnhours) iter(50) or**

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

sp75\_1003\_2\_c\_4lag dropped and 103 obs not used

note: sp75\_1322\_c\_4lag != 0 predicts success perfectly

sp75\_1322\_c\_4lag dropped and 4 obs not used

note: sp75\_155\_c\_4lag != 0 predicts success perfectly

sp75\_155\_c\_4lag dropped and 9 obs not used

note: sp75\_327\_c\_4lag != 0 predicts success perfectly

sp75\_327\_c\_4lag dropped and 8 obs not used

note: sp75\_510\_c\_4lag != 0 predicts success perfectly

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

Iteration 0: log pseudolikelihood = -11219.64

Iteration 1: log pseudolikelihood = -10594.898

Iteration 2: log pseudolikelihood = -10542.734

Iteration 3: log pseudolikelihood = -10541.464

Iteration 4: log pseudolikelihood = -10541.455

Iteration 5: log pseudolikelihood = -10541.455

Logistic regression Number of obs = 22,317

Wald chi2(160) = .

Log pseudolikelihood = -10541.455 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\_c\_4lag | 1.210182 .1310539 1.76 0.078 .9787498 1.496337

sp75\_1311\_c\_4lag | .4374859 .1831233 -1.98 0.048 .1926048 .9937128

sp75\_1400\_1\_c\_4lag | 1.143982 .7471902 0.21 0.837 .3180229 4.115099

sp75\_1404\_1\_c\_4lag | 2.998788 2.822168 1.17 0.243 .4741082 18.96767

sp75\_1405\_1\_c\_4lag | 2.874401 2.062279 1.47 0.141 .7044349 11.7288

sp75\_500\_1\_c\_4lag | .6947911 .3499977 -0.72 0.470 .2588604 1.864846

sp75\_501\_c\_4lag | 1.039313 .16703 0.24 0.810 .7584872 1.424114

sp75\_506\_1\_c\_4lag | 1.050046 .132888 0.39 0.700 .8193794 1.345649

sp75\_507\_1\_c\_4lag | 1.026926 .0412261 0.66 0.508 .9492214 1.110991

sp75\_508\_1\_c\_4lag | 1.213159 .4812773 0.49 0.626 .5574861 2.639985

sp75\_512\_1\_c\_4lag | .9854616 .3414061 -0.04 0.966 .4997435 1.943266

sp75\_811\_c\_4lag | 1.001502 .1009514 0.01 0.988 .82196 1.220262

sp75\_1002\_c\_4lag | .922792 .0550618 -1.35 0.178 .8209444 1.037275

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

sp75\_1322\_c\_4lag | 1 (omitted)

sp75\_1719\_2\_c\_4lag | .9735895 .2917111 -0.09 0.929 .5411719 1.751526

sp75\_212\_c\_4lag | 1.245564 .1259813 2.17 0.030 1.021579 1.518658

sp75\_332\_c\_4lag | 1.051631 .1725277 0.31 0.759 .7624612 1.450472

sp75\_501\_2\_c\_4lag | .8748192 .1337795 -0.87 0.382 .6482619 1.180555

sp75\_502\_c\_4lag | .9256775 .2975623 -0.24 0.810 .4929899 1.738127

sp75\_602\_c\_4lag | 1.098772 .0798367 1.30 0.195 .9529267 1.26694

sp75\_812\_c\_4lag | .6435754 .2622168 -1.08 0.279 .289593 1.430246

sp75\_1003\_c\_4lag | .9654416 .1120672 -0.30 0.762 .7689882 1.212083

sp75\_153\_c\_4lag | 1.460318 1.418732 0.39 0.697 .2175131 9.804136

sp75\_203\_c\_4lag | 1.017546 .0218548 0.81 0.418 .9756004 1.061295

sp75\_213\_c\_4lag | .8319045 .2286958 -0.67 0.503 .4853699 1.425851

sp75\_343\_c\_4lag | 1.793293 .6199857 1.69 0.091 .9106881 3.531284

sp75\_373\_c\_4lag | 1.981493 1.249506 1.08 0.278 .5757512 6.819465

sp75\_503\_c\_4lag | 1.005553 .005869 0.95 0.343 .9941157 1.017122

sp75\_523\_c\_4lag | 1.018649 .0435177 0.43 0.665 .9368291 1.107615

sp75\_523\_3\_c\_4lag | .9694077 .0148321 -2.03 0.042 .9407688 .9989184

sp75\_603\_c\_4lag | 1.125407 .1172379 1.13 0.257 .9175647 1.380328

sp75\_703\_3\_c\_4lag | .9362636 .0780636 -0.79 0.430 .7951092 1.102477

sp48\_24\_c\_4lag | 1.273026 .0291076 10.56 0.000 1.217236 1.331374

sp48\_4\_c\_4lag | .3939355 .3821708 -0.96 0.337 .0588362 2.637582

sp75\_1404\_c\_4lag | .437014 .2452883 -1.47 0.140 .1454558 1.312985

sp75\_1719\_4\_c\_4lag | 1.062592 .0957619 0.67 0.501 .8905444 1.267879

sp75\_204\_c\_4lag | 1.079175 .0358634 2.29 0.022 1.011125 1.151806

sp75\_334\_c\_4lag | 1.050413 .0777465 0.66 0.506 .9085701 1.214401

sp75\_524\_c\_4lag | .9011529 .3303586 -0.28 0.776 .4392906 1.848609

sp75\_604\_c\_4lag | 1.026664 .0128815 2.10 0.036 1.001724 1.052224

sp75\_703\_4\_c\_4lag | .5225146 .2530324 -1.34 0.180 .2022537 1.349896

sp48\_25\_c\_4lag | 1.006756 .2009406 0.03 0.973 .680818 1.488735

sp48\_5\_c\_4lag | .9946603 .1647699 -0.03 0.974 .7189017 1.376195

sp75\_1315\_c\_4lag | .8869761 .7094617 -0.15 0.881 .1849546 4.253621

sp75\_1403\_5\_c\_4lag | 1.018736 .0459085 0.41 0.680 .932616 1.112808

sp75\_1405\_c\_4lag | .9924886 .0890073 -0.08 0.933 .8325091 1.183211

sp75\_155\_c\_4lag | 1 (omitted)

sp75\_1725\_c\_4lag | 1.02028 .0107153 1.91 0.056 .9994933 1.0415

sp75\_205\_c\_4lag | 1.471624 .3189065 1.78 0.075 .9623617 2.250378

sp75\_215\_c\_4lag | .220029 .1279994 -2.60 0.009 .0703563 .6881083

sp75\_505\_c\_4lag | 1.262901 .3323776 0.89 0.375 .7539543 2.115404

sp75\_605\_c\_4lag | .9882503 .0303102 -0.39 0.700 .9305937 1.049479

sp48\_26\_c\_4lag | 1.081936 .0959818 0.89 0.375 .9092615 1.287402

sp48\_6\_c\_4lag | .9277367 .0829954 -0.84 0.402 .7785314 1.105537

sp75\_1316\_c\_4lag | .6674518 .1523086 -1.77 0.076 .4267571 1.0439

sp75\_1403\_6\_c\_4lag | 1.093277 .0400912 2.43 0.015 1.017457 1.174747

sp75\_156\_c\_4lag | .8298623 .5333733 -0.29 0.772 .2354602 2.924789

sp75\_1906\_c\_4lag | 1.390389 .2340361 1.96 0.050 .9996745 1.933812

sp75\_1916\_c\_4lag | 1.167644 .2832331 0.64 0.523 .725832 1.878386

sp75\_606\_c\_4lag | .9998269 .020413 -0.01 0.993 .9606081 1.040647

sp75\_816\_c\_4lag | .9551021 .0528696 -0.83 0.407 .8569029 1.064555

sp75\_906\_c\_4lag | .5143404 .1665273 -2.05 0.040 .2726831 .9701593

sp48\_27\_c\_4lag | .866926 .149139 -0.83 0.406 .6187969 1.214552

sp48\_7\_c\_4lag | 1.237324 .1380109 1.91 0.056 .9943527 1.539665

sp75\_1403\_7\_c\_4lag | .6450364 .1000087 -2.83 0.005 .4760045 .8740926

sp75\_207\_c\_4lag | 1.268803 .2383099 1.27 0.205 .8780504 1.83345

sp75\_327\_c\_4lag | 1 (omitted)

sp75\_337\_c\_4lag | .9762024 .0786891 -0.30 0.765 .8335406 1.143281

sp75\_507\_c\_4lag | 1.014641 .1141325 0.13 0.897 .8138875 1.264912

sp75\_607\_c\_4lag | .9838644 .0758493 -0.21 0.833 .8458889 1.144345

sp75\_807\_c\_4lag | 1.058158 .0232368 2.57 0.010 1.013581 1.104695

sp75\_817\_c\_4lag | 1.077454 .6044753 0.13 0.894 .3588031 3.2355

sp48\_28\_c\_4lag | .8875831 .103566 -1.02 0.307 .7061356 1.115655

sp48\_8\_c\_4lag | 1.402088 .2060621 2.30 0.021 1.051177 1.870142

sp75\_1318\_c\_4lag | .5935019 .7058842 -0.44 0.661 .0576822 6.106644

sp75\_1403\_8\_c\_4lag | .9490127 .0390989 -1.27 0.204 .8753927 1.028824

sp75\_208\_c\_4lag | .9287194 .0284396 -2.41 0.016 .8746186 .9861667

sp75\_388\_c\_4lag | 1.052561 .0882879 0.61 0.541 .8929958 1.240639

sp75\_209\_c\_4lag | .9952062 .0813792 -0.06 0.953 .847831 1.168199

sp75\_389\_c\_4lag | .8444173 .1933159 -0.74 0.460 .5391233 1.322593

sp75\_509\_c\_4lag | 1.334328 .4784562 0.80 0.421 .660759 2.694523

sp75\_100\_c\_4lag | 2.714115 1.023559 2.65 0.008 1.296043 5.683777

sp75\_1400\_c\_4lag | 1.124964 .1642899 0.81 0.420 .8449461 1.497781

sp75\_1403\_10\_c\_4lag | 1.124098 .0566383 2.32 0.020 1.018394 1.240773

sp75\_160\_c\_4lag | 1.1265 .3745242 0.36 0.720 .5871307 2.161363

sp75\_1720\_c\_4lag | 1.059383 .0585316 1.04 0.296 .9506564 1.180545

sp75\_340\_c\_4lag | 1.092002 .0338466 2.84 0.005 1.027639 1.160397

sp75\_500\_c\_4lag | 1.077959 .0978357 0.83 0.408 .9022923 1.287827

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

sp75\_810\_c\_4lag | .9032722 .0583885 -1.57 0.116 .7957855 1.025277

mine\_time | 1.001127 .0025966 0.43 0.664 .9960505 1.006229

onsite\_insp\_hours | 1.00308 .0004785 6.45 0.000 1.002142 1.004018

|

state |

AL | 1.011303 .386655 0.03 0.977 .4780113 2.139558

AR | 1.697052 .1800782 4.98 0.000 1.37839 2.089383

CO | 1.543397 .2756027 2.43 0.015 1.087626 2.190159

IL | 3.727066 1.08037 4.54 0.000 2.111681 6.578184

IN | 1.375218 .2621322 1.67 0.095 .9465053 1.998114

MD | 1.688643 .4515911 1.96 0.050 .9997756 2.852157

MT | .6097339 .0665612 -4.53 0.000 .4922883 .7551987

NM | 3.6661 .3538435 13.46 0.000 3.034228 4.429557

OH | 1.341745 .3121036 1.26 0.206 .8504952 2.116743

OK | 3.350574 1.427915 2.84 0.005 1.453324 7.724601

PA | 1.764411 .2111973 4.74 0.000 1.395443 2.230937

TN | 2.032489 .4551239 3.17 0.002 1.310459 3.15234

UT | .4802869 .1589214 -2.22 0.027 .2511008 .9186572

VA | 1.066091 .087406 0.78 0.435 .9078345 1.251936

WV | 1.658507 .1269926 6.61 0.000 1.427383 1.927056

WY | 4.945968 .6695433 11.81 0.000 3.793349 6.448813

|

time |

2000.75 | 1.828965 .3213071 3.44 0.001 1.296191 2.580727

2001 | 2.230781 .4054889 4.41 0.000 1.562191 3.185516

2001.25 | 2.30776 .3978317 4.85 0.000 1.646088 3.235401

2001.5 | 2.731763 .4718981 5.82 0.000 1.947163 3.832514

2001.75 | 2.199563 .3766379 4.60 0.000 1.572471 3.076737

2002 | 2.355856 .406428 4.97 0.000 1.679968 3.303669

2002.25 | 2.034933 .3513199 4.12 0.000 1.450757 2.854337

2002.5 | 2.813296 .4860188 5.99 0.000 2.005228 3.947

2002.75 | 1.917904 .3346674 3.73 0.000 1.362371 2.699967

2003 | 2.067234 .3810938 3.94 0.000 1.440359 2.966937

2003.25 | 2.210269 .4073496 4.30 0.000 1.540174 3.171907

2003.5 | 3.429765 .6462514 6.54 0.000 2.370703 4.96194

2003.75 | 1.770562 .314721 3.21 0.001 1.249707 2.508499

2004 | 1.876213 .3288573 3.59 0.000 1.330718 2.645321

2004.25 | 1.68674 .2952535 2.99 0.003 1.19688 2.377091

2004.5 | 1.935616 .3291726 3.88 0.000 1.386958 2.701316

2004.75 | 1.478325 .2443311 2.37 0.018 1.069269 2.043868

2005 | 1.559944 .2711963 2.56 0.011 1.109501 2.193262

2005.25 | 1.589805 .2700435 2.73 0.006 1.139618 2.217831

2005.5 | 1.782014 .3047296 3.38 0.001 1.27454 2.491547

2005.75 | 1.2871 .2165223 1.50 0.134 .9255903 1.789804

2006 | 1.590351 .2657954 2.78 0.006 1.146124 2.206756

2006.25 | 1.44153 .2409256 2.19 0.029 1.038869 2.000261

2006.5 | 1.74217 .2870118 3.37 0.001 1.261422 2.406139

2006.75 | 1.374651 .2381576 1.84 0.066 .9788637 1.930468

2007 | 1.140051 .1837863 0.81 0.416 .8311957 1.563672

2007.25 | 1.162638 .1853099 0.95 0.344 .8506943 1.588968

2007.5 | 1.443476 .2314753 2.29 0.022 1.054171 1.976551

2007.75 | 1.187831 .1900227 1.08 0.282 .8681288 1.625269

2008 | 1.112816 .1918772 0.62 0.535 .7936978 1.560241

2008.25 | 1.110745 .1839237 0.63 0.526 .8029112 1.536602

2008.5 | 1.078164 .1684797 0.48 0.630 .7937273 1.464529

2009 | 1.025618 .1788919 0.15 0.885 .7286452 1.443628

2009.25 | 1.015811 .1781159 0.09 0.929 .7203775 1.432404

2009.5 | 1.093376 .1861618 0.52 0.600 .7831432 1.526504

2009.75 | .8424514 .1456957 -0.99 0.322 .6002551 1.182371

2010 | 1.059614 .1936509 0.32 0.751 .7406027 1.516037

2010.25 | .9535527 .1637173 -0.28 0.782 .6810834 1.335024

2010.5 | 1.31232 .2359264 1.51 0.131 .9225981 1.866669

2010.75 | .7990652 .1470386 -1.22 0.223 .5571214 1.146079

2011 | .8763808 .1472787 -0.79 0.432 .6304427 1.21826

2011.25 | 1.050081 .1862498 0.28 0.783 .7417334 1.486613

2011.5 | 1.376428 .2487316 1.77 0.077 .9659048 1.961428

2011.75 | .8559397 .1523392 -0.87 0.382 .6038753 1.213219

2012 | .9600259 .166472 -0.24 0.814 .6834103 1.348604

2012.25 | 1.049641 .1859096 0.27 0.784 .7417853 1.485263

2012.5 | 1.00164 .1851994 0.01 0.993 .6971522 1.439115

2012.75 | .5105049 .0933706 -3.68 0.000 .3567109 .7306065

2013 | .8270779 .1535897 -1.02 0.307 .5747473 1.190189

2013.25 | .8195299 .1609674 -1.01 0.311 .5576692 1.204351

2013.5 | .8523509 .1681982 -0.81 0.418 .578958 1.254844

2013.75 | .5442281 .1070104 -3.09 0.002 .3701783 .8001123

2014 | .6435783 .1366529 -2.08 0.038 .4244859 .9757522

2014.25 | .6401953 .1279318 -2.23 0.026 .4327277 .9471313

2014.5 | .7070773 .1520535 -1.61 0.107 .4638955 1.077739

2014.75 | .8196336 .1749793 -0.93 0.352 .5393879 1.245484

2015 | .6333202 .1317826 -2.20 0.028 .4212147 .9522328

2015.25 | .5033227 .1082326 -3.19 0.001 .3302231 .7671594

2015.5 | .9313817 .1997263 -0.33 0.740 .61178 1.417947

2015.75 | .5746616 .1248938 -2.55 0.011 .375333 .879848

2016 | .3678678 .0913348 -4.03 0.000 .2261279 .598452

|

\_cons | .000031 4.56e-06 -70.69 0.000 .0000233 .0000414

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 = 22317

number of covariate patterns = 22314

Pearson chi2(22148) = 55652.10

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -14809.37

Iteration 1: log likelihood = -10806.139

Iteration 2: log likelihood = -10585.637

Iteration 3: log likelihood = -10443.718

Iteration 4: log likelihood = -10395.066

Iteration 5: log likelihood = -10395.015

Iteration 6: log likelihood = -10395.015

Logistic regression Number of obs = 22,317

LR chi2(2) = 8828.71

Prob > chi2 = 0.0000

Log likelihood = -10395.015 Pseudo R2 = 0.2981

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

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

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

\_hat | .9756321 .0152072 64.16 0.000 .9458265 1.005438

\_hatsq | .1158445 .0056748 20.41 0.000 .1047221 .1269669

\_cons | -.1442231 .0189659 -7.60 0.000 -.1813956 -.1070507

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

Note: 0 failures and 78 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 11865 3032 | 14897

- | 1993 5427 | 7420

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

Total | 13858 8459 | 22317

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

True D defined as dv\_indicator != 0

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

Sensitivity Pr( +| D) 85.62%

Specificity Pr( -|~D) 64.16%

Positive predictive value Pr( D| +) 79.65%

Negative predictive value Pr(~D| -) 73.14%

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

False + rate for true ~D Pr( +|~D) 35.84%

False - rate for true D Pr( -| D) 14.38%

False + rate for classified + Pr(~D| +) 20.35%

False - rate for classified - Pr( D| -) 26.86%

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

Correctly classified 77.48%

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

**. summ dv\_indicator bv3\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bv3\_yhat | 22,317 .6209616 .2805314 .00016 1