. // Model PS.Q.B.SP.V.4

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

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

sp75\_1322\_c\_lag\_all dropped and 3 obs not used

note: sp48\_4\_c\_lag\_all != 0 predicts failure perfectly

sp48\_4\_c\_lag\_all dropped and 4 obs not used

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

sp75\_155\_c\_lag\_all dropped and 97 obs not used

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

sp75\_510\_c\_lag\_all dropped and 28 obs not used

note: 8.state != 0 predicts failure perfectly

8.state dropped and 1 obs not used

note: sp48\_24\_c\_lag\_all omitted because of collinearity

Iteration 0: log pseudolikelihood = -9637.1102

Iteration 1: log pseudolikelihood = -9045.2882

Iteration 2: log pseudolikelihood = -8990.8251

Iteration 3: log pseudolikelihood = -8987.8538

Iteration 4: log pseudolikelihood = -8987.7405

Iteration 5: log pseudolikelihood = -8987.7401

Logistic regression Number of obs = 19,158

Wald chi2(164) = .

Log pseudolikelihood = -8987.7401 Prob > chi2 = .

(Std. Err. adjusted for 1,287 clusters in mineid)

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

| Robust

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

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

sp48\_11\_c\_lag\_all | 1.021467 .0835913 0.26 0.795 .8700949 1.199174

sp75\_1311\_c\_lag\_all | .5886717 .2249088 -1.39 0.165 .2783952 1.244757

sp75\_1400\_1\_c\_lag\_all | .4947148 .4131975 -0.84 0.399 .0962524 2.54272

sp75\_1404\_1\_c\_lag\_all | .8788519 .2387912 -0.48 0.635 .5159853 1.496904

sp75\_1405\_1\_c\_lag\_all | .8286038 .2021132 -0.77 0.441 .5137144 1.33651

sp75\_500\_1\_c\_lag\_all | 1.25014 .7994112 0.35 0.727 .3569862 4.377899

sp75\_501\_c\_lag\_all | 1.003259 .0917209 0.04 0.972 .8386749 1.200141

sp75\_506\_1\_c\_lag\_all | 1.061849 .1218304 0.52 0.601 .8480095 1.329611

sp75\_507\_1\_c\_lag\_all | 1.013586 .0311236 0.44 0.660 .9543847 1.076461

sp75\_508\_1\_c\_lag\_all | .9241145 .2666462 -0.27 0.784 .5249502 1.626798

sp75\_512\_1\_c\_lag\_all | .4640953 .1831131 -1.95 0.052 .2141696 1.005673

sp75\_811\_c\_lag\_all | 1.016215 .0638735 0.26 0.798 .8984295 1.149443

sp75\_1002\_c\_lag\_all | .916505 .0584066 -1.37 0.171 .8088908 1.038436

sp75\_1003\_2\_c\_lag\_all | 3.246075 1.714677 2.23 0.026 1.15273 9.140911

sp75\_1322\_c\_lag\_all | 1 (omitted)

sp75\_1719\_2\_c\_lag\_all | 1.402985 .2196042 2.16 0.031 1.032328 1.906727

sp75\_212\_c\_lag\_all | 1.052252 .072298 0.74 0.459 .9196773 1.203938

sp75\_332\_c\_lag\_all | 1.069373 .1280592 0.56 0.575 .845661 1.352265

sp75\_501\_2\_c\_lag\_all | .9522396 .1100792 -0.42 0.672 .7591841 1.194388

sp75\_502\_c\_lag\_all | .7396266 .2040241 -1.09 0.274 .4307355 1.270031

sp75\_602\_c\_lag\_all | 1.046529 .0443667 1.07 0.283 .9630865 1.137201

sp75\_812\_c\_lag\_all | .8093893 .1790714 -0.96 0.339 .5246087 1.248761

sp75\_1003\_c\_lag\_all | .9493865 .0307217 -1.61 0.108 .8910427 1.01155

sp75\_153\_c\_lag\_all | .5146815 .3438421 -0.99 0.320 .1389563 1.906334

sp75\_203\_c\_lag\_all | .993768 .0139648 -0.44 0.656 .9667711 1.021519

sp75\_213\_c\_lag\_all | .8954646 .358765 -0.28 0.783 .4083357 1.96372

sp75\_343\_c\_lag\_all | .9974579 .2038988 -0.01 0.990 .6681797 1.489004

sp75\_373\_c\_lag\_all | 1.160279 .4802256 0.36 0.719 .5155377 2.611347

sp75\_503\_c\_lag\_all | .9968004 .0030311 -1.05 0.292 .9908772 1.002759

sp75\_523\_c\_lag\_all | .9896671 .0246157 -0.42 0.676 .9425784 1.039108

sp75\_523\_3\_c\_lag\_all | .9815169 .0091733 -2.00 0.046 .9637012 .9996618

sp75\_603\_c\_lag\_all | 1.088389 .0992105 0.93 0.353 .9103204 1.30129

sp75\_703\_3\_c\_lag\_all | 1.087411 .0841117 1.08 0.279 .9344428 1.265419

sp48\_24\_c\_lag\_all | 1 (omitted)

sp48\_4\_c\_lag\_all | 1 (omitted)

sp75\_1404\_c\_lag\_all | .3606767 .1295639 -2.84 0.005 .1783798 .7292738

sp75\_1719\_4\_c\_lag\_all | .9906504 .0657679 -0.14 0.887 .8697819 1.128315

sp75\_204\_c\_lag\_all | 1.03827 .0260334 1.50 0.134 .9884786 1.090569

sp75\_334\_c\_lag\_all | .948244 .0348061 -1.45 0.148 .8824215 1.018976

sp75\_524\_c\_lag\_all | .9130545 .1931675 -0.43 0.667 .6031355 1.382224

sp75\_604\_c\_lag\_all | 1.008614 .0067594 1.28 0.201 .9954523 1.021949

sp75\_703\_4\_c\_lag\_all | 1.156831 .3232424 0.52 0.602 .6690007 2.000383

sp48\_25\_c\_lag\_all | .9573302 .086887 -0.48 0.631 .8013217 1.143712

sp48\_5\_c\_lag\_all | 1.124905 .1534592 0.86 0.388 .8609838 1.469726

sp75\_1315\_c\_lag\_all | 1.225631 1.278937 0.19 0.845 .1585393 9.475071

sp75\_1403\_5\_c\_lag\_all | 1.000899 .0146002 0.06 0.951 .9726886 1.029928

sp75\_1405\_c\_lag\_all | 1.014485 .0458067 0.32 0.750 .9285638 1.108357

sp75\_155\_c\_lag\_all | 1 (omitted)

sp75\_1725\_c\_lag\_all | .9935794 .0043228 -1.48 0.139 .985143 1.002088

sp75\_205\_c\_lag\_all | 1.47339 .2303338 2.48 0.013 1.084552 2.001637

sp75\_215\_c\_lag\_all | .4381311 .2580519 -1.40 0.161 .1381213 1.389785

sp75\_505\_c\_lag\_all | 1.107771 .1541704 0.74 0.462 .8433095 1.455169

sp75\_605\_c\_lag\_all | 1.015725 .0215192 0.74 0.461 .9744123 1.05879

sp48\_26\_c\_lag\_all | 1.055243 .0807524 0.70 0.482 .908269 1.226001

sp48\_6\_c\_lag\_all | 1.017637 .0801525 0.22 0.824 .8720664 1.187508

sp75\_1316\_c\_lag\_all | .7613669 .1842597 -1.13 0.260 .473798 1.223474

sp75\_1403\_6\_c\_lag\_all | 1.020207 .0144452 1.41 0.158 .9922839 1.048915

sp75\_156\_c\_lag\_all | .5537433 .3070509 -1.07 0.286 .1867742 1.641724

sp75\_1906\_c\_lag\_all | 1.135274 .0770917 1.87 0.062 .9938001 1.296887

sp75\_1916\_c\_lag\_all | .9117408 .0756189 -1.11 0.265 .7749498 1.072678

sp75\_606\_c\_lag\_all | .9869703 .0088895 -1.46 0.145 .9697 1.004548

sp75\_816\_c\_lag\_all | .9296951 .0406056 -1.67 0.095 .8534208 1.012786

sp75\_906\_c\_lag\_all | 1.008925 .2463262 0.04 0.971 .6252305 1.628086

sp48\_27\_c\_lag\_all | 1.050882 .1071957 0.49 0.627 .8604524 1.283457

sp48\_7\_c\_lag\_all | 1.029452 .1038648 0.29 0.774 .8447444 1.254546

sp75\_1403\_7\_c\_lag\_all | .8834362 .0469571 -2.33 0.020 .7960338 .9804352

sp75\_207\_c\_lag\_all | 1.196 .1602824 1.34 0.182 .9197234 1.555268

sp75\_327\_c\_lag\_all | 2.072027 3.602657 0.42 0.675 .0686123 62.5733

sp75\_337\_c\_lag\_all | 1.005796 .0695735 0.08 0.933 .8782745 1.151834

sp75\_507\_c\_lag\_all | 1.121758 .0746156 1.73 0.084 .9846461 1.277963

sp75\_607\_c\_lag\_all | .9967548 .0392633 -0.08 0.934 .9226959 1.076758

sp75\_807\_c\_lag\_all | 1.01647 .0134941 1.23 0.218 .9903636 1.043265

sp75\_817\_c\_lag\_all | .9275671 .5347927 -0.13 0.896 .2996274 2.871502

sp48\_28\_c\_lag\_all | .9745802 .0689288 -0.36 0.716 .848428 1.11949

sp48\_8\_c\_lag\_all | 1.173276 .1341847 1.40 0.162 .9376707 1.468081

sp75\_1318\_c\_lag\_all | .8561556 .3888215 -0.34 0.732 .3515451 2.085088

sp75\_1403\_8\_c\_lag\_all | .9746444 .0136081 -1.84 0.066 .9483346 1.001684

sp75\_208\_c\_lag\_all | .9805596 .0167029 -1.15 0.249 .9483629 1.013849

sp75\_388\_c\_lag\_all | 1.082464 .0875461 0.98 0.327 .9237854 1.268399

sp75\_209\_c\_lag\_all | 1.001315 .0591499 0.02 0.982 .8918426 1.124224

sp75\_389\_c\_lag\_all | .7982171 .1388879 -1.30 0.195 .5675628 1.122608

sp75\_509\_c\_lag\_all | 1.423583 .264717 1.90 0.058 .9887831 2.04958

sp75\_100\_c\_lag\_all | 1.574081 .3765935 1.90 0.058 .9848725 2.515788

sp75\_1400\_c\_lag\_all | 1.099846 .1136467 0.92 0.357 .898209 1.346747

sp75\_1403\_10\_c\_lag\_all | 1.048816 .0282366 1.77 0.077 .994908 1.105645

sp75\_160\_c\_lag\_all | 1.491155 .4279085 1.39 0.164 .8496857 2.616902

sp75\_1720\_c\_lag\_all | 1.082059 .0417398 2.04 0.041 1.003267 1.16704

sp75\_340\_c\_lag\_all | 1.037352 .0178467 2.13 0.033 1.002956 1.072927

sp75\_500\_c\_lag\_all | 1.032008 .0666105 0.49 0.625 .9093745 1.17118

sp75\_510\_c\_lag\_all | 1 (omitted)

sp75\_810\_c\_lag\_all | .9686647 .021673 -1.42 0.155 .9271044 1.012088

mine\_time | 1.001749 .0049278 0.36 0.722 .9921372 1.011454

onsite\_insp\_hours | 1.003957 .0004988 7.95 0.000 1.00298 1.004935

|

state |

AL | 1.015676 .39542 0.04 0.968 .4735524 2.178424

CO | 1.619547 .3509955 2.22 0.026 1.059052 2.476679

IL | 5.655206 1.818856 5.39 0.000 3.010792 10.62224

IN | 1.835611 .659455 1.69 0.091 .9077808 3.711763

MD | 1.889079 .8624796 1.39 0.164 .7720133 4.622484

MT | 1 (empty)

NM | 1.763422 .4444399 2.25 0.024 1.076033 2.889926

OH | 1.297405 .3257951 1.04 0.300 .7931002 2.122381

OK | 4.148996 1.680031 3.51 0.000 1.876163 9.1752

PA | 1.732314 .2168725 4.39 0.000 1.355385 2.214066

TN | 1.738807 .3795258 2.53 0.011 1.133604 2.667112

UT | .5239375 .1454246 -2.33 0.020 .3041018 .9026926

VA | 1.117348 .1051327 1.18 0.238 .9291751 1.343628

WV | 1.63761 .1334798 6.05 0.000 1.395822 1.921282

WY | 4.119905 1.635848 3.57 0.000 1.891948 8.9715

|

time |

2000.25 | 1.480198 .197557 2.94 0.003 1.139496 1.922767

2000.5 | 1.563015 .224156 3.11 0.002 1.180022 2.070313

2000.75 | .771878 .1039393 -1.92 0.054 .5928268 1.005008

2001 | .9551701 .1344406 -0.33 0.745 .7248927 1.2586

2001.25 | .9513388 .1338869 -0.35 0.723 .7220066 1.253514

2001.5 | 1.205951 .1860949 1.21 0.225 .8912045 1.631856

2001.75 | .9528144 .1444643 -0.32 0.750 .707865 1.282526

2002 | 1.057695 .1590092 0.37 0.709 .7877607 1.420124

2002.25 | .8661483 .1353664 -0.92 0.358 .6376198 1.176583

2002.5 | 1.237452 .2033367 1.30 0.195 .8967261 1.707642

2002.75 | .780821 .1255383 -1.54 0.124 .5697674 1.070053

2003 | .8956776 .1606079 -0.61 0.539 .630259 1.272871

2003.25 | .9065026 .1583789 -0.56 0.574 .6436533 1.276692

2003.5 | 1.365339 .2339331 1.82 0.069 .9758838 1.910218

2003.75 | .7060883 .1236523 -1.99 0.047 .5009496 .9952312

2004 | .7442217 .1274446 -1.73 0.085 .5320321 1.041038

2004.25 | .6877234 .1154808 -2.23 0.026 .4948597 .9557525

2004.5 | .7178937 .1242678 -1.91 0.056 .5113482 1.007868

2004.75 | .5668864 .0971874 -3.31 0.001 .4051031 .7932802

2005 | .6977321 .1233757 -2.04 0.042 .4933736 .9867372

2005.25 | .6049154 .1038684 -2.93 0.003 .4320531 .8469392

2005.5 | .7054354 .1281976 -1.92 0.055 .4940487 1.007267

2005.75 | .5221313 .0937289 -3.62 0.000 .3672643 .7423022

2006 | .6560328 .1244801 -2.22 0.026 .4522857 .9515645

2006.25 | .5431297 .0947657 -3.50 0.000 .3858205 .7645782

2006.5 | .6638578 .118471 -2.30 0.022 .4679194 .9418443

2006.75 | .5585496 .1047435 -3.11 0.002 .3867567 .8066509

2007 | .5242077 .0957266 -3.54 0.000 .3664915 .7497957

2007.25 | .4481816 .0818131 -4.40 0.000 .3133804 .640968

2007.5 | .5672393 .1050942 -3.06 0.002 .3945132 .8155884

2007.75 | .4593806 .0819442 -4.36 0.000 .3238437 .6516432

2008 | .4499441 .0835048 -4.30 0.000 .3127409 .6473399

2008.25 | .4579517 .0876108 -4.08 0.000 .3147575 .6662897

2008.5 | .4370786 .0800419 -4.52 0.000 .3052668 .6258056

2008.75 | .4503688 .081134 -4.43 0.000 .3163911 .6410801

2009 | .514892 .0954782 -3.58 0.000 .3579933 .7405553

2009.25 | .5285215 .106764 -3.16 0.002 .355726 .7852531

2009.5 | .4099323 .0835088 -4.38 0.000 .2749861 .6111018

2009.75 | .4573552 .0897339 -3.99 0.000 .3113482 .6718324

2010 | .4383626 .0940504 -3.84 0.000 .2878781 .6675107

2010.25 | .4593937 .0929596 -3.84 0.000 .3089884 .6830115

2010.5 | .6595347 .1406294 -1.95 0.051 .4342502 1.001694

2010.75 | .3864711 .0809166 -4.54 0.000 .2563884 .5825533

2011 | .4474164 .0933638 -3.85 0.000 .2972274 .6734957

2011.25 | .4293826 .0895513 -4.05 0.000 .2853115 .6462038

2011.5 | .5623645 .1132728 -2.86 0.004 .3789369 .8345818

2011.75 | .4509407 .0953932 -3.76 0.000 .2978887 .6826293

2012 | .3548998 .0723 -5.09 0.000 .2380672 .5290687

2012.25 | .4921453 .1027796 -3.39 0.001 .3268349 .7410681

2012.5 | .443066 .098152 -3.67 0.000 .2870136 .6839655

2012.75 | .176367 .0400587 -7.64 0.000 .1130008 .2752663

2013 | .3686895 .0865665 -4.25 0.000 .2327035 .5841423

2013.25 | .3607623 .0867542 -4.24 0.000 .2251794 .577981

2013.5 | .2892981 .0718065 -5.00 0.000 .1778563 .4705674

2013.75 | .2277778 .0554671 -6.08 0.000 .1413291 .3671056

2014 | .2855275 .0734967 -4.87 0.000 .1724023 .4728821

2014.25 | .2448978 .0639685 -5.39 0.000 .1467733 .4086229

2014.5 | .2706962 .0679214 -5.21 0.000 .1655404 .4426498

2014.75 | .402941 .1097879 -3.34 0.001 .2362205 .6873302

2015 | .2885293 .0735169 -4.88 0.000 .1751075 .4754172

2015.25 | .1725389 .0448067 -6.77 0.000 .1037142 .2870356

2015.5 | .3249153 .0852087 -4.29 0.000 .1943316 .5432465

2015.75 | .1930759 .0528075 -6.01 0.000 .1129586 .3300176

2016 | .1165291 .0377408 -6.64 0.000 .0617663 .2198451

|

\_cons | .0000763 8.45e-06 -85.61 0.000 .0000615 .0000949

lnhours | 1 (offset)

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

(est1 stored)

**. lfit**

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

number of observations = 19158

number of covariate patterns = 19144

Pearson chi2(18977) = 67714.52

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -12622.963

Iteration 1: log likelihood = -9279.5087

Iteration 2: log likelihood = -9027.3271

Iteration 3: log likelihood = -8877.7263

Iteration 4: log likelihood = -8755.3482

Iteration 5: log likelihood = -8748.0679

Iteration 6: log likelihood = -8748.0137

Iteration 7: log likelihood = -8748.0137

Logistic regression Number of obs = 19,158

LR chi2(2) = 7749.90

Prob > chi2 = 0.0000

Log likelihood = -8748.0137 Pseudo R2 = 0.3070

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

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

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

\_hat | .9685112 .0166501 58.17 0.000 .9358776 1.001145

\_hatsq | .1343715 .0053061 25.32 0.000 .1239717 .1447714

\_cons | -.1704828 .0203323 -8.38 0.000 -.2103334 -.1306322

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

Note: 0 failures and 185 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 10350 2560 | 12910

- | 1722 4526 | 6248

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

Total | 12072 7086 | 19158

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

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

Sensitivity Pr( +| D) 85.74%

Specificity Pr( -|~D) 63.87%

Positive predictive value Pr( D| +) 80.17%

Negative predictive value Pr(~D| -) 72.44%

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

False + rate for true ~D Pr( +|~D) 36.13%

False - rate for true D Pr( -| D) 14.26%

False + rate for classified + Pr(~D| +) 19.83%

False - rate for classified - Pr( D| -) 27.56%

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

Correctly classified 77.65%

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

**. summ dv\_indicator bv4\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bv4\_yhat | 19,158 .6301284 .2819857 .0001471 1