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

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

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

sp75\_1003\_2\_ss\_c\_4lag dropped and 36 obs not used

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

sp75\_1322\_ss\_c\_4lag dropped and 1 obs not used

note: sp75\_1318\_ss\_c\_4lag != 0 predicts failure perfectly

sp75\_1318\_ss\_c\_4lag dropped and 1 obs not used

note: sp75\_1404\_ss\_c\_4lag != 0 predicts success perfectly

sp75\_1404\_ss\_c\_4lag dropped and 10 obs not used

note: sp75\_153\_ss\_c\_4lag != 0 predicts success perfectly

sp75\_153\_ss\_c\_4lag dropped and 4 obs not used

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

sp75\_155\_ss\_c\_4lag dropped and 4 obs not used

note: sp75\_1906\_ss\_c\_4lag != 0 predicts success perfectly

sp75\_1906\_ss\_c\_4lag dropped and 18 obs not used

note: sp75\_373\_ss\_c\_4lag != 0 predicts failure perfectly

sp75\_373\_ss\_c\_4lag dropped and 3 obs not used

note: sp75\_817\_ss\_c\_4lag != 0 predicts success perfectly

sp75\_817\_ss\_c\_4lag dropped and 16 obs not used

Iteration 0: log pseudolikelihood = -11219.501

Iteration 1: log pseudolikelihood = -10599.523

Iteration 2: log pseudolikelihood = -10554.453

Iteration 3: log pseudolikelihood = -10553.123

Iteration 4: log pseudolikelihood = -10553.109

Iteration 5: log pseudolikelihood = -10553.109

Logistic regression Number of obs = 22,353

Wald chi2(150) = .

Log pseudolikelihood = -10553.109 Prob > chi2 = .

(Std. Err. adjusted for 1,292 clusters in mineid)

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

| Robust

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

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

sp48\_11\_ss\_c\_4lag | 1.475565 .2593432 2.21 0.027 1.045568 2.082401

sp48\_25\_ss\_c\_4lag | 1.040378 .2506598 0.16 0.869 .6487987 1.668293

sp48\_26\_ss\_c\_4lag | 1.250668 .1688075 1.66 0.097 .9599574 1.629416

sp48\_27\_ss\_c\_4lag | .6831659 .1545507 -1.68 0.092 .4384915 1.064366

sp48\_28\_ss\_c\_4lag | 1.049144 .2074126 0.24 0.808 .7121227 1.545664

sp48\_4\_ss\_c\_4lag | .5213706 .5906529 -0.57 0.565 .0566022 4.802418

sp48\_5\_ss\_c\_4lag | 1.103896 .2496582 0.44 0.662 .7086303 1.719637

sp48\_6\_ss\_c\_4lag | .7378662 .1020109 -2.20 0.028 .5627273 .9675142

sp48\_7\_ss\_c\_4lag | 1.204971 .1788272 1.26 0.209 .9008486 1.611765

sp48\_8\_ss\_c\_4lag | 1.50015 .3941946 1.54 0.123 .8963221 2.510759

sp75\_100\_ss\_c\_4lag | 2.659285 1.625424 1.60 0.110 .8025797 8.811331

sp75\_1002\_ss\_c\_4lag | 1.165895 .2710134 0.66 0.509 .7392591 1.838747

sp75\_1003\_ss\_c\_4lag | .9393323 .1641128 -0.36 0.720 .6669664 1.322923

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

sp75\_1311\_ss\_c\_4lag | .2168187 .1109498 -2.99 0.003 .0795285 .5911136

sp75\_1315\_ss\_c\_4lag | .8398201 .6943483 -0.21 0.833 .1661223 4.245654

sp75\_1316\_ss\_c\_4lag | .4191353 .1256168 -2.90 0.004 .2329406 .7541596

sp75\_1318\_ss\_c\_4lag | 1 (omitted)

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

sp75\_1400\_ss\_c\_4lag | 2.040512 .9861675 1.48 0.140 .7913318 5.261625

sp75\_1400\_1\_ss\_c\_4lag | .5912597 .2926372 -1.06 0.288 .2241226 1.559807

sp75\_1403\_10\_ss\_c\_4lag | 1.22748 .1230996 2.04 0.041 1.008441 1.494096

sp75\_1403\_5\_ss\_c\_4lag | 1.107216 .0708902 1.59 0.112 .9766378 1.255252

sp75\_1403\_6\_ss\_c\_4lag | 1.078889 .0578967 1.41 0.157 .971177 1.198547

sp75\_1403\_7\_ss\_c\_4lag | .6927443 .1417811 -1.79 0.073 .4638323 1.03463

sp75\_1403\_8\_ss\_c\_4lag | 1.007912 .1312349 0.06 0.952 .7808937 1.300927

sp75\_1404\_ss\_c\_4lag | 1 (omitted)

sp75\_1404\_1\_ss\_c\_4lag | .8879922 .5777186 -0.18 0.855 .2480997 3.17828

sp75\_1405\_ss\_c\_4lag | 1.085015 .1260337 0.70 0.482 .8640949 1.362417

sp75\_1405\_1\_ss\_c\_4lag | 1.492991 .294181 2.03 0.042 1.014694 2.196742

sp75\_153\_ss\_c\_4lag | 1 (omitted)

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

sp75\_156\_ss\_c\_4lag | .1964437 .0706281 -4.53 0.000 .0970962 .397442

sp75\_1719\_2\_ss\_c\_4lag | .1945834 .0528432 -6.03 0.000 .1142731 .331335

sp75\_1719\_4\_ss\_c\_4lag | 1.142408 .3790878 0.40 0.688 .5961636 2.18916

sp75\_1720\_ss\_c\_4lag | 1.090303 .0661666 1.42 0.154 .9680347 1.228015

sp75\_1725\_ss\_c\_4lag | 1.01431 .0123793 1.16 0.244 .9903349 1.038866

sp75\_1906\_ss\_c\_4lag | 1 (omitted)

sp75\_1916\_ss\_c\_4lag | 1.197361 .3508568 0.61 0.539 .6742199 2.126417

sp75\_203\_ss\_c\_4lag | 1.027161 .0288864 0.95 0.341 .9720762 1.085366

sp75\_204\_ss\_c\_4lag | 1.252146 .0794143 3.55 0.000 1.105783 1.417883

sp75\_205\_ss\_c\_4lag | 1.860756 .5934998 1.95 0.052 .9958483 3.476846

sp75\_207\_ss\_c\_4lag | 1.261031 .3088643 0.95 0.344 .780263 2.03803

sp75\_208\_ss\_c\_4lag | .9565653 .036461 -1.17 0.244 .8877072 1.030765

sp75\_209\_ss\_c\_4lag | 1.058241 .116291 0.52 0.606 .8531895 1.312575

sp75\_212\_ss\_c\_4lag | .913474 .0975405 -0.85 0.397 .7409777 1.126127

sp75\_213\_ss\_c\_4lag | .6967546 .1668706 -1.51 0.131 .4357322 1.114141

sp75\_215\_ss\_c\_4lag | .1712721 .164085 -1.84 0.066 .0261942 1.119873

sp75\_332\_ss\_c\_4lag | .8511066 .2109476 -0.65 0.515 .5236159 1.383423

sp75\_334\_ss\_c\_4lag | 1.015421 .123481 0.13 0.900 .8000836 1.288716

sp75\_337\_ss\_c\_4lag | 1.008635 .1760371 0.05 0.961 .7164305 1.42002

sp75\_340\_ss\_c\_4lag | 1.065822 .0562366 1.21 0.227 .9611083 1.181945

sp75\_343\_ss\_c\_4lag | 1.975852 1.249222 1.08 0.281 .5722509 6.822164

sp75\_373\_ss\_c\_4lag | 1 (omitted)

sp75\_388\_ss\_c\_4lag | 1.102482 .1110094 0.97 0.333 .9050316 1.34301

sp75\_389\_ss\_c\_4lag | .9249061 .4125345 -0.18 0.861 .3858668 2.21696

sp75\_500\_ss\_c\_4lag | 1.69842 .4153413 2.17 0.030 1.051689 2.742854

sp75\_500\_1\_ss\_c\_4lag | .2993643 .1212891 -2.98 0.003 .1353103 .6623218

sp75\_501\_ss\_c\_4lag | .4209031 .2504934 -1.45 0.146 .1311003 1.351327

sp75\_501\_2\_ss\_c\_4lag | .3762714 .166319 -2.21 0.027 .1582173 .8948461

sp75\_502\_ss\_c\_4lag | 1.123631 .5514884 0.24 0.812 .4293844 2.940365

sp75\_503\_ss\_c\_4lag | 1.049106 .0183688 2.74 0.006 1.013714 1.085733

sp75\_505\_ss\_c\_4lag | 1.367889 .5891094 0.73 0.467 .588117 3.181546

sp75\_506\_1\_ss\_c\_4lag | .9160261 .2821585 -0.28 0.776 .5008606 1.675324

sp75\_507\_ss\_c\_4lag | 1.51502 .370535 1.70 0.089 .9380722 2.446811

sp75\_507\_1\_ss\_c\_4lag | .9164156 .1067778 -0.75 0.454 .7293117 1.151521

sp75\_509\_ss\_c\_4lag | 1.096254 .3986716 0.25 0.801 .5374734 2.235966

sp75\_512\_1\_ss\_c\_4lag | .4776178 .1958263 -1.80 0.072 .2138368 1.066789

sp75\_523\_ss\_c\_4lag | .9809247 .0469721 -0.40 0.688 .8930493 1.077447

sp75\_523\_3\_ss\_c\_4lag | .9704747 .0226669 -1.28 0.199 .9270499 1.015933

sp75\_524\_ss\_c\_4lag | 1.373497 .7637963 0.57 0.568 .4618257 4.084864

sp75\_602\_ss\_c\_4lag | .8710466 .1295698 -0.93 0.353 .650764 1.165894

sp75\_603\_ss\_c\_4lag | 1.194263 .217355 0.98 0.329 .8359533 1.706153

sp75\_604\_ss\_c\_4lag | 1.026171 .0169309 1.57 0.117 .9935178 1.059897

sp75\_605\_ss\_c\_4lag | 1.053795 .0597417 0.92 0.355 .9429742 1.17764

sp75\_606\_ss\_c\_4lag | .9925902 .0327157 -0.23 0.821 .930496 1.058828

sp75\_607\_ss\_c\_4lag | .9775401 .1067156 -0.21 0.835 .7892435 1.21076

sp75\_703\_3\_ss\_c\_4lag | 1.125997 .2425009 0.55 0.582 .7382743 1.717342

sp75\_807\_ss\_c\_4lag | 1.054289 .0513946 1.08 0.278 .9582204 1.15999

sp75\_810\_ss\_c\_4lag | 1.174574 .2759578 0.68 0.493 .7411337 1.861505

sp75\_811\_ss\_c\_4lag | .4452134 .1149622 -3.13 0.002 .2683938 .7385229

sp75\_812\_ss\_c\_4lag | .4518317 .202978 -1.77 0.077 .1873218 1.089846

sp75\_816\_ss\_c\_4lag | .8905956 .1710761 -0.60 0.546 .6111837 1.297745

sp75\_817\_ss\_c\_4lag | 1 (omitted)

sp75\_906\_ss\_c\_4lag | .561248 .2025569 -1.60 0.110 .2766639 1.138563

mine\_time | 1.000723 .0025952 0.28 0.780 .9956497 1.005823

onsite\_insp\_hours | 1.003585 .0004658 7.71 0.000 1.002672 1.004498

|

state |

AL | 1.063614 .3739021 0.18 0.861 .5340151 2.118434

AR | 1.815407 .1642994 6.59 0.000 1.52033 2.167754

CO | 1.762045 .31772 3.14 0.002 1.237469 2.508996

IL | 4.152309 1.17998 5.01 0.000 2.37903 7.247352

IN | 1.514063 .3209329 1.96 0.050 .9993475 2.293884

MD | 1.877194 .5292761 2.23 0.026 1.080221 3.262166

MT | .6221471 .0499515 -5.91 0.000 .5315585 .7281739

NM | 4.207298 .3415702 17.70 0.000 3.58838 4.932968

OH | 1.385474 .3077312 1.47 0.142 .8964699 2.141218

OK | 3.830205 1.328314 3.87 0.000 1.941 7.558203

PA | 1.760961 .2038094 4.89 0.000 1.403569 2.209356

TN | 2.132426 .5148103 3.14 0.002 1.328547 3.422717

UT | .5157755 .1721466 -1.98 0.047 .2681398 .9921105

VA | 1.085729 .0890772 1.00 0.316 .9244552 1.275138

WV | 1.741919 .1342116 7.20 0.000 1.497768 2.02587

WY | 5.720837 .5124686 19.47 0.000 4.79965 6.818826

|

time |

2000.75 | 1.774737 .3087437 3.30 0.001 1.261984 2.495825

2001 | 2.166395 .3918098 4.27 0.000 1.519816 3.088049

2001.25 | 2.212797 .3781311 4.65 0.000 1.583015 3.09313

2001.5 | 2.59946 .4441598 5.59 0.000 1.859695 3.633496

2001.75 | 2.107435 .3576346 4.39 0.000 1.511138 2.939031

2002 | 2.2519 .3859399 4.74 0.000 1.60941 3.150877

2002.25 | 1.94641 .3316646 3.91 0.000 1.393771 2.718176

2002.5 | 2.713795 .46334 5.85 0.000 1.941991 3.792338

2002.75 | 1.847356 .3167866 3.58 0.000 1.320036 2.585328

2003 | 2.021551 .3650173 3.90 0.000 1.419022 2.879918

2003.25 | 2.180839 .3960382 4.29 0.000 1.527729 3.113157

2003.5 | 3.361133 .6261244 6.51 0.000 2.333032 4.842289

2003.75 | 1.730683 .3061595 3.10 0.002 1.223599 2.447913

2004 | 1.763763 .3080724 3.25 0.001 1.252457 2.483806

2004.25 | 1.584622 .2759565 2.64 0.008 1.126398 2.229254

2004.5 | 1.792994 .3049073 3.43 0.001 1.284777 2.502245

2004.75 | 1.40595 .2309591 2.07 0.038 1.018922 1.939988

2005 | 1.493998 .2580831 2.32 0.020 1.064897 2.096004

2005.25 | 1.517382 .2580226 2.45 0.014 1.087308 2.117567

2005.5 | 1.706295 .2918925 3.12 0.002 1.220227 2.385983

2005.75 | 1.223542 .202558 1.22 0.223 .8845081 1.692527

2006 | 1.503645 .250408 2.45 0.014 1.084904 2.084008

2006.25 | 1.365765 .2289254 1.86 0.063 .9833318 1.896932

2006.5 | 1.677355 .2718404 3.19 0.001 1.220886 2.30449

2006.75 | 1.318994 .2246239 1.63 0.104 .9446779 1.841628

2007 | 1.106169 .1757419 0.64 0.525 .810191 1.510274

2007.25 | 1.12013 .1762206 0.72 0.471 .8229174 1.524688

2007.5 | 1.402818 .2222261 2.14 0.033 1.028393 1.913567

2007.75 | 1.143151 .1822028 0.84 0.401 .8364375 1.562333

2008 | 1.092111 .1859489 0.52 0.605 .7822333 1.524744

2008.25 | 1.081335 .1757169 0.48 0.630 .7863932 1.486895

2008.5 | 1.070231 .1649853 0.44 0.660 .7911473 1.447763

2009 | 1.035392 .1783829 0.20 0.840 .738678 1.45129

2009.25 | 1.028141 .1787779 0.16 0.873 .7312091 1.445651

2009.5 | 1.117364 .1895183 0.65 0.513 .8013471 1.558004

2009.75 | .8559454 .1453329 -0.92 0.360 .613647 1.193915

2010 | 1.066879 .1933284 0.36 0.721 .7479447 1.521811

2010.25 | .9463969 .1610047 -0.32 0.746 .6780529 1.32094

2010.5 | 1.318718 .2338727 1.56 0.119 .9315209 1.866858

2010.75 | .7892614 .1451939 -1.29 0.198 .5503415 1.131904

2011 | .8472253 .1416082 -0.99 0.321 .6105568 1.175633

2011.25 | 1.000031 .1756692 0.00 1.000 .7087416 1.411038

2011.5 | 1.316223 .2369889 1.53 0.127 .9248449 1.873226

2011.75 | .8300651 .1466865 -1.05 0.292 .5870708 1.173637

2012 | .9302741 .1606075 -0.42 0.675 .6632158 1.304869

2012.25 | 1.007167 .1773077 0.04 0.968 .713265 1.422172

2012.5 | .9622891 .1773672 -0.21 0.835 .6705232 1.381012

2012.75 | .4906532 .0888664 -3.93 0.000 .3440378 .6997503

2013 | .7948951 .1455871 -1.25 0.210 .5551497 1.138176

2013.25 | .792988 .1524561 -1.21 0.228 .5440247 1.155885

2013.5 | .8217232 .1594595 -1.01 0.312 .5617532 1.202003

2013.75 | .5415011 .1044392 -3.18 0.001 .3710464 .7902609

2014 | .6145387 .1282768 -2.33 0.020 .4081993 .9251799

2014.25 | .6161066 .1210243 -2.47 0.014 .4192286 .9054423

2014.5 | .6850616 .1451707 -1.78 0.074 .4522227 1.037784

2014.75 | .7948322 .1659225 -1.10 0.271 .5279414 1.196645

2015 | .6231202 .1272239 -2.32 0.021 .4176187 .9297447

2015.25 | .4887397 .1026921 -3.41 0.001 .3237624 .7377834

2015.5 | .904959 .1919519 -0.47 0.638 .5971447 1.371444

2015.75 | .5554458 .118736 -2.75 0.006 .3653279 .8445017

2016 | .3515156 .0858298 -4.28 0.000 .2178242 .5672612

|

\_cons | .0000318 4.60e-06 -71.54 0.000 .0000239 .0000422

lnhours | 1 (offset)

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

(est1 stored)

**. lfit**

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

number of observations = 22353

number of covariate patterns = 22348

Pearson chi2(22192) = 53001.43

Prob > chi2 = 0.0000

**. linktest**

Iteration 0: log likelihood = -14824.519

Iteration 1: log likelihood = -10820.182

Iteration 2: log likelihood = -10469.064

Iteration 3: log likelihood = -10402.883

Iteration 4: log likelihood = -10402.817

Iteration 5: log likelihood = -10402.817

Logistic regression Number of obs = 22,353

LR chi2(2) = 8843.40

Prob > chi2 = 0.0000

Log likelihood = -10402.817 Pseudo R2 = 0.2983

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

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

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

\_hat | .9805623 .0152354 64.36 0.000 .9507015 1.010423

\_hatsq | .1173875 .0056347 20.83 0.000 .1063438 .1284313

\_cons | -.1468892 .0189457 -7.75 0.000 -.184022 -.1097563

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

Note: 0 failures and 49 successes completely determined.

**. estat classification**

Logistic model for dv\_indicator

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

Classified | D ~D | Total

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

+ | 11904 3060 | 14964

- | 1994 5395 | 7389

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

Total | 13898 8455 | 22353

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

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

Sensitivity Pr( +| D) 85.65%

Specificity Pr( -|~D) 63.81%

Positive predictive value Pr( D| +) 79.55%

Negative predictive value Pr(~D| -) 73.01%

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

False + rate for true ~D Pr( +|~D) 36.19%

False - rate for true D Pr( -| D) 14.35%

False + rate for classified + Pr(~D| +) 20.45%

False - rate for classified - Pr( D| -) 26.99%

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

Correctly classified 77.39%

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

**. summ dv\_indicator bssv3\_yhat**

Variable | Obs Mean Std. Dev. Min Max

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

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

bssv3\_yhat | 22,353 .621751 .2796664 .0002638 .9999959