```
  __  ___ ___ ___  ___(R)
 /__    /  / __/  /  /___/
 ___/  /  /__/   /  /___/
```
Statistics/Data Analysis

```
         name:   <unnamed>
          log:   C:\Documents and Settings\demorris\Desktop\Untitled.smcl
     log type:   smcl
    opened on:   2 Dec 2009, 13:31:54
```

1 . do "C:\DOCUME~1\demorris\LOCALS~1\Temp\STD01000000.tmp"

2 . // Documentation examples
3 . net from http://labs.fhcrc.org/pepe/stata/
_____

  http://labs.fhcrc.org/pepe/stata/
  Stata materials for diagnostic and screening methods
_____

        Margaret Pepe, Fred Hutchinson Cancer Research Center
                    Seattle, WA

  PLACES you could -**net link**- to:
        stata   official Stata website

  PACKAGES you could -**net describe**-:
        pcvsuite   percentile value based calculation of ROC measures
        binscrn   summarize and compare screening tests with binary outcome
        predictiveness   evaluate marker risk distribution
        orchsel   gene selection from the orchid glass mRNA expression microarra
  > y
        screensize   power calculations for one-sample screening studies
        lrreg   diagnostic likelihood ratio regression
        beta   programs in development
_____

4 . use http://labs.fhcrc.org/pepe/book/data/nnhs2
  (Norton - neonatal audiology data)

5 .
6 . rocreg d y1, cluster(id) noccsamp nsamp(5000)

                    ROC regression for markers: **DPOAE 65 at 2kHz**
                    regression model covariates: **none**

                percentile value calculation
                                    method: **empirical**
                             tie correction: **no**

                    GLM fit of binormal curve
                          number of points: **10**
                          on FPR interval: **(0,1)**
                             link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
    w/o respect to case/control status

              number of bootstrap samples: **5000**

  ****
  model results for marker: **DPOAE 65 at 2kHz**

     ROC-GLM model

Bootstrap results   Number of obs   =   5058
                                           Number of clusters =   2742
                                           Replications   =   5000
```

|  | Observed Coef. | Bias | Bootstrap Std. Err. | [95% Conf. Interval] | | |
|---|---|---|---|---|---|---|
| alpha_0 | .45227072 | .0020873 | .09625281 | .2636187 | .6409227 | (N) |
|  |  |  |  | .2700206 | .6460105 | (P) |
|  |  |  |  | .2693907 | .6447756 | (BC) |
| alpha_1 | .89985263 | .0190082 | .07054173 | .7615934 | 1.038112 | (N) |
|  |  |  |  | .7850404 | 1.059469 | (P) |
|  |  |  |  | .7541633 | 1.025022 | (BC) |

(N)    normal confidence interval
(P)    percentile confidence interval
(BC)   bias-corrected confidence interval


7 . rocreg d y1, adjcov(gender) regcov(gender) cluster(id) noccsamp level(90) nsamp(50
> 00)

ROC regression for markers: **DPOAE 65 at 2kHz**
model intercept term covariates: **Gender**

percentile value calculation
method: **empirical**
tie correction: **no**

Covariate adjustment for p.v. calculation:
method: **stratified**
covariates: **Gender**

# of case-containing strata: **2**

| stratum | Hearing impaired no | yes | Total |
|---|---|---|---|
| 1 | 2,170 | 64 | 2,234 |
| 2 | 2,739 | 85 | 2,824 |
| Total | 4,909 | 149 | 5,058 |

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
w/o respect to case/control status
and from within covariate strata

number of bootstrap samples: **5000**

******************************
model results for marker: **DPOAE 65 at 2kHz**

ROC-GLM model

Bootstrap results
Number of strata   =          2          Number of obs     =     5058
                                         Number of clusters =    2742
                                         Replications      =     5000

| | Observed Coef. | Bias | Bootstrap Std. Err. | [90% Conf. Interval] | | |
|---|---|---|---|---|---|---|
| alpha_0 | .4954336 | -.0154626 | .31881089 | -.0289637 | 1.019831 | (N) |
| | | | | -.0386125 | 1.012976 | (P) |
| | | | | -.0105609 | 1.046985 | (BC) |
| alpha_1 | .91414529 | .0115261 | .0725835 | .7947561 | 1.033535 | (N) |
| | | | | .8084724 | 1.0484 | (P) |
| | | | | .7897618 | 1.026077 | (BC) |
| gender | -.02847892 | .0128785 | .19329717 | -.3464245 | .2894666 | (N) |
| | | | | -.3363732 | .3037118 | (P) |
| | | | | -.3586637 | .2773806 | (BC) |

(N)    normal confidence interval
(P)    percentile confidence interval
(BC)   bias-corrected confidence interval

8 . rocreg d y1, adjcov(gender) regcov(gender) cluster(id) noccsamp pvcmeth(normal) ns
> amp(5000)

        ROC regression for markers: **DPOAE 65 at 2kHz**
   model intercept term covariates: **Gender**

       percentile value calculation
                            method: **normal**

   Covariate adjustment for p.v. calculation:
                            method: **stratified**
                        covariates: **Gender**

       # of case-containing strata: **2**

| stratum | Hearing impaired no | yes | Total |
|---|---|---|---|
| 1 | 2,170 | 64 | 2,234 |
| 2 | 2,739 | 85 | 2,824 |
| Total | 4,909 | 149 | 5,058 |

        GLM fit of binormal curve
                   number of points: **10**
                 on FPR interval: **(0,1)**
                   link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
    w/o respect to case/control status
    and from within covariate strata

        number of bootstrap samples: **5000**

*****************************
 model results for marker: **DPOAE 65 at 2kHz**

    ROC-GLM model

Bootstrap results
Number of strata   =           2              Number of obs      =      5058
                                              Number of clusters =      2742
                                              Replications       =      5000

|  | Observed Coef. | Bias | Bootstrap Std. Err. | [95% Conf. Interval] | | |
|---|---|---|---|---|---|---|
| alpha_0 | .48019621 | .01657 | .31995565 | -.1469053 | 1.107298 | (N) |
|  |  |  |  | -.1215759 | 1.119515 | (P) |
|  |  |  |  | -.1554876 | 1.078164 | (BC) |
| alpha_1 | 1.0372177 | .0090629 | .08270205 | .8751247 | 1.199311 | (N) |
|  |  |  |  | .8962832 | 1.22027 | (P) |
|  |  |  |  | .8870934 | 1.210276 | (BC) |
| gender | -.00853414 | -.0071799 | .19169867 | -.3842566 | .3671884 | (N) |
|  |  |  |  | -.3871066 | .3652664 | (P) |
|  |  |  |  | -.3625396 | .3840744 | (BC) |

(N)    normal confidence interval
(P)    percentile confidence interval
(BC)   bias-corrected confidence interval

9 . rocreg d y1 y2, adjcov(currage gender) regcov(currage) cluster(id) noccsamp adjmod
> el(linear) nsamp(5000)

            ROC regression for markers: DPOAE 65 at 2kHz
                                         TEOAE 80 at 2kHz
         model intercept term covariates: currage

            percentile value calculation
                               method: empirical
                       tie correction: no

    Covariate adjustment for p.v. calculation:
                               method: linear model
                            covariates: currage
                                         Gender

            GLM fit of binormal curve
                      number of points: 10
                      on FPR interval: (0,1)
                        link function: probit

    model coefficient bootstrap se's and CI's based on sampling
     w/o respect to case/control status

            number of bootstrap samples: 5000

*****************************
 model results for marker: DPOAE 65 at 2kHz

    covariate adjustment - linear model, controls only

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| Model | 2418.56541 | 2 | 1209.2827 | Number of obs = | 4907 |
| Residual | 294662.363 | 4904 | 60.0861263 | F( 2, 4904) = | 20.13 |
|  |  |  |  | Prob > F = | 0.0000 |
|  |  |  |  | R-squared = | 0.0081 |
| Total | 297080.929 | 4906 | 60.5546125 | Adj R-squared = | 0.0077 |
|  |  |  |  | Root MSE = | 7.7515 |

| y1 | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| currage | -.2032456 | .0323905 | -6.27 | 0.000 | -.2667455 | -.1397458 |
| gender | .2471744 | .2229119 | 1.11 | 0.268 | -.1898327 | .6841815 |
| _cons | -1.486659 | 1.288611 | -1.15 | 0.249 | -4.012913 | 1.039596 |

\*\*\*\*\*\*\*\*\*\*\*\*

   ROC-GLM model

Bootstrap results

| | | | Number of obs | = | 5056 |
| | | | Number of clusters | = | 2741 |
| | | | Replications | = | 5000 |

| | Observed Coef. | Bias | Bootstrap Std. Err. | [95% Conf. Interval] | | |
|---|---|---|---|---|---|---|
| alpha_0 | -1.2725052 | -.0111466 | 1.1469959 | -3.520576 | .9755656 | (N) |
| | | | | -3.504232 | .9759839 | (P) |
| | | | | -3.488447 | 1.000709 | (BC) |
| alpha_1 | .93723935 | .0158551 | .07324127 | .7936891 | 1.08079 | (N) |
| | | | | .8181139 | 1.101256 | (P) |
| | | | | .7891824 | 1.072007 | (BC) |
| currage | .04482277 | .0003758 | .02985235 | -.0136868 | .1033323 | (N) |
| | | | | -.0140999 | .1036241 | (P) |
| | | | | -.0141529 | .1034659 | (BC) |

(N)    normal confidence interval
(P)    percentile confidence interval
(BC)   bias-corrected confidence interval


\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*
 model results for marker: **TEOAE 80 at 2kHz**

   covariate adjustment - linear model, controls only

| Source | SS | df | MS | | | |
|---|---|---|---|---|---|---|
| Model | 2186.03352 | 2 | 1093.01676 | Number of obs = | | 4907 |
| Residual | 239493.534 | 4904 | 48.836365 | F( 2, 4904) = | | 22.38 |
| | | | | Prob > F = | | 0.0000 |
| | | | | R-squared = | | 0.0090 |
| Total | 241679.567 | 4906 | 49.2620398 | Adj R-squared = | | 0.0086 |
| | | | | Root MSE = | | 6.9883 |

| y2 | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| currage | -.1694143 | .0292013 | -5.80 | 0.000 | -.2266619 | -.1121667 |
| gender | .7014169 | .2009638 | 3.49 | 0.000 | .3074379 | 1.095396 |
| _cons | -6.348757 | 1.161733 | -5.46 | 0.000 | -8.626274 | -4.07124 |


\*\*\*\*\*\*\*\*\*\*\*\*

   ROC-GLM model

Bootstrap results

| | | | Number of obs | = | 5056 |
| | | | Number of clusters | = | 2741 |
| | | | Replications | = | 5000 |

|  | Observed Coef. | Bias | Bootstrap Std. Err. | [95% Conf. Interval] | |  |
|---|---|---|---|---|---|---|
| alpha_0 | -1.5230578 | -.0107908 | 1.0602577 | -3.601125 | .5550091 | (N) |
|  |  |  |  | -3.638514 | .5566745 | (P) |
|  |  |  |  | -3.625396 | .5611143 | (BC) |
| alpha_1 | .91524142 | .0003605 | .07278358 | .7725882 | 1.057895 | (N) |
|  |  |  |  | .7809041 | 1.061402 | (P) |
|  |  |  |  | .7828526 | 1.063127 | (BC) |
| currage | .04831011 | .0003541 | .02745323 | -.0054972 | .1021174 | (N) |
|  |  |  |  | -.0050978 | .1025711 | (P) |
|  |  |  |  | -.005904 | .1021563 | (BC) |

(N)     normal confidence interval
(P)     percentile confidence interval
(BC)    bias-corrected confidence interval


10 . rocreg d y1, adjcov(gender) regcov(gender) sregcov(gender) cluster(id) link(logit)
> noccsamp nsamp(5000)

             ROC regression for markers: DPOAE 65 at 2kHz
      model intercept term covariates: Gender
         model slope term covariates: Gender

         percentile value calculation
                           method: empirical
                   tie correction: no

    Covariate adjustment for p.v. calculation:
                           method: stratified
                        covariates: Gender

         # of case-containing strata: 2


|  | Hearing impaired | | |
| stratum | no | yes | Total |
|---|---|---|---|
| 1 | 2,170 | 64 | 2,234 |
| 2 | 2,739 | 85 | 2,824 |
| Total | 4,909 | 149 | 5,058 |


         GLM fit of bilogistic curve
              number of points: 10
              on FPR interval: (0,1)
              link function: logit

    model coefficient bootstrap se's and CI's based on sampling
     w/o respect to case/control status
     and from within covariate strata

         number of bootstrap samples: 5000

*****************************
 model results for marker: DPOAE 65 at 2kHz

    ROC-GLM model

Bootstrap results
Number of strata   =          2          Number of obs    =      5058
                                         Number of clusters =    2742
                                         Replications     =      5000

|  | Observed Coef. | Bias | Bootstrap Std. Err. | [95% Conf. Interval] | | |
|---|---|---|---|---|---|---|
| alpha_0 | .79251075 | -.0390368 | .54663394 | -.2788721 | 1.863894 | (N) |
|  |  |  |  | -.2673674 | 1.838046 | (P) |
|  |  |  |  | -.1893941 | 1.967267 | (BC) |
| alpha_1 | .84065402 | -.0061474 | .24032019 | .3696351 | 1.311673 | (N) |
|  |  |  |  | .3927532 | 1.329521 | (P) |
|  |  |  |  | .41792 | 1.366839 | (BC) |
| gender | -.02582361 | .0296068 | .33606927 | -.6845073 | .6328601 | (N) |
|  |  |  |  | -.6506544 | .6575448 | (P) |
|  |  |  |  | -.7151449 | .5822774 | (BC) |
| s_gender | .04364135 | .0138044 | .1538119 | -.2578244 | .3451071 | (N) |
|  |  |  |  | -.2462344 | .3575775 | (P) |
|  |  |  |  | -.2728522 | .3336513 | (BC) |

(N)    normal confidence interval
(P)    percentile confidence interval
(BC)   bias-corrected confidence interval


```
11 .
12 .
13 .
14 .
15 . // Covariate adjustment
16 . gen dis = d

17 . gen m1 = y1

18 . gen m2 = y2

19 . gen m3 = y3

20 .
21 . // One marker
22 . rocreg d m1, adjcov(gender) adjmodel(stratified) pvcmeth(empirical) nsamp(5000)
```

        ROC regression for markers: **m1**
        regression model covariates: **none**

    percentile value calculation
                        method: **empirical**
                tie correction: **no**

Covariate adjustment for p.v. calculation:
                        method: **stratified**
                    covariates: **Gender**

    # of case-containing strata: **2**

stratum	Hearing impaired no	yes	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

        GLM fit of binormal curve
                number of points: **10**
                on FPR interval: **(0,1)**
                link function: **probit**

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model coefficient bootstrap se's and CI's based on sampling
   separately from cases and controls
   and from within covariate strata

          number of bootstrap samples: **5000**

****
 model results for marker: **m1**

    ROC-GLM model

Bootstrap results
Number of strata   =   **4**   Number of obs   =   **5058**
                                                        Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.45067599	.002209	.08922569	.2757969	.6255551	(N)
				.2820803	.6290717	(P)
				.2810496	.6282501	(BC)
alpha_1	.91391307	.0064594	.06958749	.7775241	1.050302	(N)
				.7919681	1.062517	(P)
				.782406	1.05415	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

23 . test alpha_0

  (1) **alpha_0 = 0**

          chi2(1) =   **25.51**
          Prob > chi2 =   **0.0000**

24 . test alpha_1

  (1) **alpha_1 = 0**

          chi2(1) = **172.48**
          Prob > chi2 =   **0.0000**

25 . rocreg d m1, adjcov(gender) adjmodel(stratified) pvcmeth(normal) nsamp(5000)

              ROC regression for markers: **m1**
            regression model covariates: **none**

           percentile value calculation
                            method: **normal**

    Covariate adjustment for p.v. calculation:
                            method: **stratified**
                          covariates: **Gender**

         # of case-containing strata: **2**

stratum	Hearing impaired no	yes	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls
and from within covariate strata

number of bootstrap samples: **5000**

****
 model results for marker: **m1**

   ROC-GLM model

Bootstrap results
Number of strata   =   **4**   Number of obs   =   **5058**
                                                 Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.46679914	.0014667	.09192271	.2866339	.6469643	(N)
				.2935516	.6483405	(P)
				.2925605	.6469402	(BC)
alpha_1	1.0372202	.0036332	.0814024	.8776745	1.196766	(N)
				.8913256	1.209785	(P)
				.8891987	1.208274	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

26 . rocreg d m1, adjcov(y2) adjmodel(linear) pvcmeth(normal) nsamp(5000)

                ROC regression for markers: **m1**
            regression model covariates: **none**

         percentile value calculation
                          method: **normal**

   Covariate adjustment for p.v. calculation:
                          method: **linear model**
                      covariates: **TEOAE 80 at 2kHz**

            GLM fit of binormal curve
                 number of points: **10**
                 on FPR interval: **(0,1)**
                 link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
    separately from cases and controls

       number of bootstrap samples: **5000**

****
 model results for marker: **m1**

   covariate adjustment - linear model, controls only

Source	SS	df	MS
Model	78508.7841	1	78508.7841
Residual	218630.999	4907	44.5549214
Total	297139.783	4908	60.5419282

Number of obs =   4909
F(1, 4907) = 1762.07
Prob > F   = 0.0000
R-squared   = 0.2642
Adj R-squared = 0.2641
Root MSE   = 6.6749

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

   ROC-GLM model

Bootstrap results
Number of strata =   2

Number of obs   =   5058
Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.30281892	-.0038463	.08959453	.1272169	.478421	(N)
				.1286902	.4775176	(P)
				.139296	.4886775	(BC)
alpha_1	1.1875188	.0020869	.08072501	1.029301	1.345737	(N)
				1.040921	1.355744	(P)
				1.039728	1.355192	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

27 . rocreg d m1, adjcov(y2) adjmodel(linear) nsamp(5000)

              ROC regression for markers: **m1**
            regression model covariates: **none**

          percentile value calculation
                            method: **empirical**
                    tie correction: **no**

   Covariate adjustment for p.v. calculation:
                            method: **linear model**
                        covariates: **TEOAE 80 at 2kHz**

          GLM fit of binormal curve
                  number of points: **10**
                on FPR interval: **(0,1)**
                    link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls

          number of bootstrap samples: **5000**

****
 model results for marker: **m1**

   covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	78508.7841	1	78508.7841		
Residual	218630.999	4907	44.5549214		
Total	297139.783	4908	60.5419282		

Number of obs = 4909
F(1, 4907) = 1762.07
Prob > F = 0.0000
R-squared = 0.2642
Adj R-squared = 0.2641
Root MSE = 6.6749

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
y2	.5697179	.0135721	41.98	0.000	.5431104 .5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535 -1.844061

****

   ROC-GLM model

Bootstrap results
Number of strata   =   2

Number of obs   =   5058
Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.27383313	.0008746	.0860421	.1051937	.4424725	(N)
				.1057249	.4474144	(P)
				.1051084	.4465286	(BC)
alpha_1	1.1136271	-.0041711	.07484619	.9669312	1.260323	(N)
				.9704007	1.264615	(P)
				.9823921	1.278704	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

28 .
29 . // Multiple markers
30 . rocreg dis y1 y2, adjcov(gender) adjmodel(stratified) pvcmeth(empirical) nsamp(500
   > 0)

          ROC regression for markers: **DPOAE 65 at 2kHz**
                                       TEOAE 80 at 2kHz
          regression model covariates: **none**

          percentile value calculation
                               method: **empirical**
                       tie correction: **no**

     Covariate adjustment for p.v. calculation:
                               method: **stratified**
                            covariates: **Gender**

          # of case-containing strata: **2**

stratum	dis 0	1	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

```
              GLM fit of binormal curve
                    number of points: 10
                    on FPR interval: (0,1)
                    link function: probit
```

model coefficient bootstrap se's and CI's based on sampling
 separately from cases and controls
 and from within covariate strata

      number of bootstrap samples: 5000

****
 model results for marker: DPOAE 65 at 2kHz

   ROC-GLM model

Bootstrap results
Number of strata   =   4   Number of obs   =   5058
                                              Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.45067599	.001841	.09060651	.2730905	.6282615	(N)
				.2785476	.6313457	(P)
				.2762574	.6299021	(BC)
alpha_1	.91391307	.0085884	.06972925	.7772463	1.05058	(N)
				.7877623	1.063646	(P)
				.7739551	1.048094	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

****
 model results for marker: TEOAE 80 at 2kHz

   ROC-GLM model

Bootstrap results
Number of strata   =   4   Number of obs   =   5058
                                              Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.32860452	.0004216	.08814071	.1558519	.5013571	(N)
				.1603469	.5012118	(P)
				.1606458	.5013657	(BC)
alpha_1	.89143211	.0071957	.06748063	.7591725	1.023692	(N)
				.7716437	1.035673	(P)
				.7610939	1.024275	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval

(BC)   bias-corrected confidence interval

31 . test alpha_0

(1) alpha_0 = 0

        chi2(1) =   13.90
      Prob > chi2 =   0.0002

32 . test alpha_1

(1) alpha_1 = 0

        chi2(1) =   174.51
      Prob > chi2 =   0.0000

33 . rocreg dis y1 y2, adjcov(gender) adjmodel(stratified) pvcmeth(normal) nsamp(5000)

                    ROC regression for markers: DPOAE 65 at 2kHz
                                                 TEOAE 80 at 2kHz
                    regression model covariates: none

            percentile value calculation
                                   method: normal

      Covariate adjustment for p.v. calculation:
                                   method: stratified
                                covariates: Gender

            # of case-containing strata: 2

| | dis | | |
stratum	0	1	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

                    GLM fit of binormal curve
                             number of points: 10
                           on FPR interval: (0,1)
                             link function: probit

      model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls
       and from within covariate strata

            number of bootstrap samples: 5000

      ****
       model results for marker: DPOAE 65 at 2kHz

          ROC-GLM model

      Bootstrap results
      Number of strata   =   4   Number of obs   =   5058
                                               Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.46679914	.0030525	.09116012	.2881286	.6454697	(N)
				.2996487	.6550039	(P)
				.2979996	.6534937	(BC)
alpha_1	1.0372202	.0028046	.08092716	.8786059	1.195835	(N)
				.8920423	1.204609	(P)
				.8912565	1.204051	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

****
 model results for marker: **TEOAE 80 at 2kHz**

    ROC-GLM model

Bootstrap results
Number of strata   =   4   Number of obs   =   **5058**
                                              Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.30881566	.0084575	.08573614	.1407759	.4768554	(N)
				.1489478	.4891934	(P)
				.1306119	.4677252	(BC)
alpha_1	.96081662	.0042595	.07200899	.8196816	1.101952	(N)
				.8309141	1.111567	(P)
				.8274147	1.106461	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

34 . rocreg dis y1 y2, adjcov(m3) adjmodel(linear) nsamp(5000)

                  ROC regression for markers: **DPOAE 65 at 2kHz**
                                              TEOAE 80 at 2kHz
                regression model covariates: **none**

           percentile value calculation
                                    method: **empirical**
                            tie correction: **no**

     Covariate adjustment for p.v. calculation:
                                    method: **linear model**
                                covariates: **m3**

           GLM fit of binormal curve
                          number of points: **10**
                           on FPR interval: **(0,1)**
                             link function: **probit**

     model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls

                  number of bootstrap samples: **5000**

****
 model results for marker: **DPOAE 65 at 2kHz**

   covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	2092.98865	1	2092.98865	
Residual	295046.795	4907	60.1277348	
Total	297139.783	4908	60.5419282	

```
Number of obs =      4909
F(  1,   4907) =     34.81
Prob > F       =    0.0000
R-squared      =    0.0070
Adj R-squared =    0.0068
Root MSE       =    7.7542
```

y1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
m3	.3871484	.0656193	5.90	0.000	.2585053 .5157916
_cons	-7.413631	.2777972	-26.69	0.000	-7.958238 -6.869024

****

   ROC-GLM model

Bootstrap results
Number of strata   =   2

```
Number of obs      =      5058
Replications       =      5000
```

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.43034285	-.0023104	.08875593	.2563844	.6043013	(N)
				.2601209	.6027464	(P)
				.2688182	.6147962	(BC)
alpha_1	.90191293	.0110712	.07193048	.7609318	1.042894	(N)
				.774999	1.056284	(P)
				.755257	1.034939	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

****
 model results for marker: **TEOAE 80 at 2kHz**

   covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	912.862843	1	912.862843	
Residual	240966.309	4907	49.1066455	
Total	241879.172	4908	49.2826349	

```
Number of obs =      4909
F(  1,   4907) =     18.59
Prob > F       =    0.0000
R-squared      =    0.0038
Adj R-squared =    0.0036
Root MSE       =    7.0076
```

y2	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
m3	.25568	.0593013	4.31	0.000	.139423 .3719371
_cons	-10.78167	.2510502	-42.95	0.000	-11.27384 -10.2895

****

ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5058
                                                   Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.32972807	.0007654	.08648591	.1602188	.4992373	(N)
				.1641281	.4994171	(P)
				.1684294	.5053784	(BC)
alpha_1	.87038147	.0113642	.06962846	.7339122	1.006851	(N)
				.7495296	1.024958	(P)
				.7361323	.9988676	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

35 . rocreg dis y1 y2, adjcov(m3) adjmodel(linear) pvcmeth(normal) nsamp(5000)

ROC regression for markers: **DPOAE 65 at 2kHz**
                            TEOAE 80 at 2kHz
     regression model covariates: **none**

     percentile value calculation
                          method: **normal**

   Covariate adjustment for p.v. calculation:
                          method: **linear model**
                       covariates: **m3**

       GLM fit of binormal curve
              number of points: **10**
              on FPR interval: **(0,1)**
              link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls

        number of bootstrap samples: **5000**

****

 model results for marker: **DPOAE 65 at 2kHz**

   covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	2092.98865	1	2092.98865		
Residual	295046.795	4907	60.1277348		
Total	297139.783	4908	60.5419282		

Number of obs =   4909
F(1, 4907) =   34.81
Prob > F   =   0.0000
R-squared   =   0.0070
Adj R-squared =   0.0068
Root MSE   =   7.7542

y1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
m3	.3871484	.0656193	5.90	0.000	.2585053	.5157916
_cons	-7.413631	.2777972	-26.69	0.000	-7.958238	-6.869024

****

ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5058
                                              Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.45549035	-.0010614	.09218734	.2748065	.6361742	(N)
				.2756491	.6397991	(P)
				.2855716	.6490131	(BC)
alpha_1	1.0154356	.0062204	.08054935	.8575617	1.173309	(N)
				.8748309	1.189763	(P)
				.8702905	1.183212	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

****
 model results for marker: **TEOAE 80 at 2kHz**

   covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	912.862843	1	912.862843	Number of obs =	4909
Residual	240966.309	4907	49.1066455	F(1, 4907) =	18.59
				Prob > F =	0.0000
				R-squared =	0.0038
				Adj R-squared =	0.0036
Total	241879.172	4908	49.2826349	Root MSE =	7.0076

y2	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
m3	.25568	.0593013	4.31	0.000	.139423	.3719371
_cons	-10.78167	.2510502	-42.95	0.000	-11.27384	-10.2895

****

   ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5058
                                              Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.30867943	-.0004846	.08661527	.1389166	.4784422	(N)
				.138824	.4813045	(P)
				.1413437	.4828293	(BC)
alpha_1	.96859729	.0022386	.07166978	.8281271	1.109067	(N)
				.8344678	1.119193	(P)
				.8338213	1.118769	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
36 .
37 . // Multiple adjcov variables
38 . rocreg d y1, adjcov(gender sitenum) adjmodel(stratified) pvcmeth(empirical) nsamp(
  > 5000)
```

                    ROC regression for markers: **DPOAE 65 at 2kHz**
                    regression model covariates: **none**

              percentile value calculation
                                    method: **empirical**
                            tie correction: **no**

        Covariate adjustment for p.v. calculation:
                                    method: **stratified**
                                covariates: **Gender**
                                            Site #

            # of case-containing strata: **12**

| | Hearing impaired | | |
stratum	no	yes	Total
1	575	9	584
2	101	4	105
3	98	7	105
4	876	26	902
5	313	7	320
6	207	11	218
7	768	11	779
8	164	4	168
9	117	5	122
10	942	40	982
11	478	21	499
12	270	4	274
Total	4,909	149	5,058

                    GLM fit of binormal curve
                            number of points: **10**
                            on FPR interval: **(0,1)**
                            link function: **probit**

        model coefficient bootstrap se's and CI's based on sampling
          separately from cases and controls
          and from within covariate strata

              number of bootstrap samples: **5000**

****
 model results for marker: **DPOAE 65 at 2kHz**

      ROC-GLM model

Bootstrap results
Number of strata   =   **24**   Number of obs   =   **5058**
                                            Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.44604635	.0003778	.08470885	.2800201	.6120726	(N)
				.2825881	.6151421	(P)
				.2849886	.6183019	(BC)
alpha_1	.94051075	-.0089786	.06853542	.8061838	1.074838	(N)
				.802947	1.069467	(P)
				.8238816	1.095533	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

39 . test alpha_0

(1) alpha_0 = 0

         chi2(1) =   27.73
       Prob > chi2 =   0.0000

40 . test alpha_1

(1) alpha_1 = 0

         chi2(1) = 188.32
       Prob > chi2 =   0.0000

41 . rocreg d y1, adjcov(gender sitenum) adjmodel(stratified) pvcmeth(normal) nsamp(500
> 0)

              ROC regression for markers: DPOAE 65 at 2kHz
              regression model covariates: none

         percentile value calculation
                            method: normal

    Covariate adjustment for p.v. calculation:
                            method: stratified
                         covariates: Gender
                                     Site #

         # of case-containing strata: 12

| | Hearing impaired | | |
stratum	no	yes	Total
1	575	9	584
2	101	4	105
3	98	7	105
4	876	26	902
5	313	7	320
6	207	11	218
7	768	11	779
8	164	4	168
9	117	5	122
10	942	40	982
11	478	21	499
12	270	4	274
Total	4,909	149	5,058

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls
and from within covariate strata

number of bootstrap samples: **5000**

****
model results for marker: **DPOAE 65 at 2kHz**

ROC-GLM model

Bootstrap results
Number of strata   =   **24**   Number of obs   =   **5058**
                                                     Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.46347407	.0068699	.08703624	.2928862	.634062	(N)
				.3034034	.6430113	(P)
				.2938257	.6336716	(BC)
alpha_1	1.015996	.0015171	.07907531	.8610112	1.170981	(N)
				.8709848	1.179893	(P)
				.8737292	1.183751	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

42 . rocreg d y1, adjcov(y3 currage) adjmodel(linear) pvcmeth(normal) nsamp(5000)

ROC regression for markers: **DPOAE 65 at 2kHz**
regression model covariates: **none**

percentile value calculation
method: **normal**

Covariate adjustment for p.v. calculation:
method: **linear model**
covariates: **ABR**
currage

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls

number of bootstrap samples: **5000**

****
model results for marker: **DPOAE 65 at 2kHz**

covariate adjustment - linear model, controls only

Source	SS	df	MS
Model	4437.78927	2	2218.89463
Residual	292643.139	4904	59.6743759
Total	297080.929	4906	60.5546125

Number of obs =   4907
F(2, 4904) =   37.18
Prob > F   = 0.0000
R-squared   = 0.0149
Adj R-squared = 0.0145
Root MSE   = 7.7249

y1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y3	.3874897	.0654273	5.92	0.000	.2592229	.5157564
currage	-.2030216	.0322674	-6.29	0.000	-.2662801	-.139763
_cons	.3941601	1.272323	0.31	0.757	-2.100163	2.888484

****

ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5056
                                        Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.44437921	.0043335	.08987984	.268218	.6205405	(N)
				.2723901	.6272426	(P)
				.2658636	.6175416	(BC)
alpha_1	1.045338	.0039906	.07939851	.8897198	1.200956	(N)
				.9032161	1.213527	(P)
				.8978879	1.208173	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

43 . rocreg d y1, adjcov(y3 currage) adjmodel(linear) nsamp(5000)

        ROC regression for markers: DPOAE 65 at 2kHz
        regression model covariates: none

        percentile value calculation
                          method: empirical
                  tie correction: no

   Covariate adjustment for p.v. calculation:
                          method: linear model
                       covariates: ABR
                                   currage

        GLM fit of binormal curve
                number of points: 10
                on FPR interval: (0,1)
                  link function: probit

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls

        number of bootstrap samples: 5000

****
 model results for marker: DPOAE 65 at 2kHz

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covariate adjustment - linear model, controls only

Source	SS	df	MS
Model	4437.78927	2	2218.89463
Residual	292643.139	4904	59.6743759
Total	297080.929	4906	60.5546125

Number of obs = 4907
F(2, 4904) = 37.18
Prob > F = 0.0000
R-squared = 0.0149
Adj R-squared = 0.0145
Root MSE = 7.7249

y1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
y3	.3874897	.0654273	5.92	0.000	.2592229 .5157564
currage	-.2030216	.0322674	-6.29	0.000	-.2662801 -.139763
_cons	.3941601	1.272323	0.31	0.757	-2.100163 2.888484

****

ROC-GLM model

Bootstrap results
Number of strata   =   2

Number of obs   =   5056
Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]	
alpha_0	.44651592	-.0060639	.08840038	.2732544	.6197775	(N)
				.2609482	.6142523	(P)
				.2822571	.6349018	(BC)
alpha_1	.95114857	-.0025422	.06785205	.818161	1.084136	(N)
				.8204006	1.085871	(P)
				.825693	1.093118	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

44 .
45 . // nostsamp
46 . rocreg d y1, adjcov(gender sitenum) adjmodel(stratified) pvcmeth(empirical) nsamp(
> 5000) nostsamp

ROC regression for markers: DPOAE 65 at 2kHz
regression model covariates: none

percentile value calculation
                    method: empirical
            tie correction: no

Covariate adjustment for p.v. calculation:
                    method: stratified
                covariates: Gender
                            Site #

       # of case-containing strata: 12

| | Hearing impaired | | |
stratum	no	yes	Total
1	575	9	584
2	101	4	105
3	98	7	105
4	876	26	902
5	313	7	320
6	207	11	218
7	768	11	779
8	164	4	168
9	117	5	122
10	942	40	982
11	478	21	499
12	270	4	274
Total	4,909	149	5,058

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls
and w/o respect to covariate strata

number of bootstrap samples: **5000**

****
model results for marker: **DPOAE 65 at 2kHz**

ROC-GLM model

Bootstrap results
Number of strata   =   **2**   Number of obs   =   **5058**
                                                 Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.44604635	.0015483	.09098914	.2677109	.6243818	(N)
				.2731806	.6370917	(P)
				.2732778	.6371002	(BC)
alpha_1	.94051075	-.0087608	.07291616	.7975977	1.083424	(N)
				.7932322	1.08036	(P)
				.8130792	1.106467	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

47 . rocreg d y1, adjcov(gender sitenum) adjmodel(stratified) pvcmeth(normal) nsamp(500
> 0) nostsamp

                    ROC regression for markers: **DPOAE 65 at 2kHz**
                    regression model covariates: **none**

            percentile value calculation
                                  method: **normal**

    Covariate adjustment for p.v. calculation:
                          method: **stratified**
                      covariates: **Gender**
                                  Site #

        # of case-containing strata: **12**

stratum	Hearing impaired no	yes	Total
1	575	9	584
2	101	4	105
3	98	7	105
4	876	26	902
5	313	7	320
6	207	11	218
7	768	11	779
8	164	4	168
9	117	5	122
10	942	40	982
11	478	21	499
12	270	4	274
Total	4,909	149	5,058

            GLM fit of binormal curve
                      number of points: **10**
                      on FPR interval: **(0,1)**
                        link function: **probit**

    model coefficient bootstrap se's and CI's based on sampling
      separately from cases and controls
      and w/o respect to covariate strata

            number of bootstrap samples: **5000**

    ****
     model results for marker: **DPOAE 65 at 2kHz**

        ROC-GLM model

    Bootstrap results
    Number of strata   =   2   Number of obs   =   5058
                                               Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.46347407	.0054601	.09199196	.2831731	.643775	(N)
				.291298	.6519605	(P)
				.2832535	.6428511	(BC)
alpha_1	1.015996	.0015594	.08077393	.857682	1.17431	(N)
				.8676247	1.187274	(P)
				.8705632	1.190252	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

48 .
49 .
50 .
51 .
52 . // regcov, sregcov with covariate adjustment
53 . // One marker
54 . rocreg dis m1, adjcov(gender) adjmodel(stratified) regcov(currage) pvcmeth(normal)
  > nsamp(5000)

          ROC regression for markers: **m1**
     model intercept term covariates: **currage**

        percentile value calculation
                             method: **normal**

   Covariate adjustment for p.v. calculation:
                             method: **stratified**
                          covariates: **Gender**

        # of case-containing strata: **2**

	dis		
stratum	0	1	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

          GLM fit of binormal curve
                    number of points: **10**
                    on FPR interval: **(0,1)**
                     link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls
     and from within covariate strata

        number of bootstrap samples: **5000**

****
 model results for marker: **m1**

    ROC-GLM model

Bootstrap results
Number of strata   =   **4**   Number of obs   =   **5058**
                                            Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	-.22577262	.0475034	1.0145627	-2.214279	1.762734	(N)
				-2.062367	1.916743	(P)
				-2.09156	1.881973	(BC)
alpha_1	1.03906	.0053597	.07983292	.8825903	1.19553	(N)
				.8955123	1.207063	(P)
				.8878677	1.201084	(BC)
currage	.01794961	-.0011724	.0263871	-.0337682	.0696674	(N)
				-.0373615	.0660245	(P)
				-.0369362	.0662716	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC) bias-corrected confidence interval

55 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(y3) pvcmeth(normal) nsamp(5000)

                 ROC regression for markers: **m1**
          model intercept term covariates: **ABR**

              percentile value calculation
                                   method: **normal**

     Covariate adjustment for p.v. calculation:
                                   method: **linear model**
                               covariates: **TEOAE 80 at 2kHz**

              GLM fit of binormal curve
                        number of points: **10**
                       on FPR interval: **(0,1)**
                        link function: **probit**

     model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls

          number of bootstrap samples: **5000**

****
 model results for marker: **m1**

     covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	78508.7841	1	78508.7841	Number of obs = 4909	
Residual	218630.999	4907	44.5549214	F(1, 4907) = 1762.07	
				Prob > F = 0.0000	
				R-squared = 0.2642	
Total	297139.783	4908	60.5419282	Adj R-squared = 0.2641	
				Root MSE = 6.6749	

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

     ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5058
                                             Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.36793676	.002709	.19104014	-.006495	.7423686	(N)
				.0021702	.7572989	(P)
				.0013734	.7565165	(BC)
alpha_1	1.1886498	.0036091	.08058125	1.030713	1.346586	(N)
				1.039063	1.359076	(P)
				1.039496	1.3602	(BC)
y3	.01994324	.0028539	.05028086	-.0786054	.1184919	(N)
				-.0686725	.1306646	(P)
				-.0702622	.1281919	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

56 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(y3) pvcmeth(empirical) nsamp(500
> 0)

                  ROC regression for markers: **m1**
          model intercept term covariates: **ABR**

              percentile value calculation
                               method: **empirical**
                        tie correction: **no**

    Covariate adjustment for p.v. calculation:
                               method: **linear model**
                            covariates: **TEOAE 80 at 2kHz**

              GLM fit of binormal curve
                      number of points: **10**
                      on FPR interval: **(0,1)**
                        link function: **probit**

    model coefficient bootstrap se's and CI's based on sampling
      separately from cases and controls

          number of bootstrap samples: **5000**

****
  model results for marker: **m1**

    covariate adjustment - linear model, controls only

Source	SS	df	MS			
Model	78508.7841	1	78508.7841			
Residual	218630.999	4907	44.5549214			
Total	297139.783	4908	60.5419282			

Number of obs =   4909
$F(1, 4907)$ = 1762.07
Prob > F   = 0.0000
R-squared   = 0.2642
Adj R-squared = 0.2641
Root MSE   = 6.6749

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5058
                                               Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.32934633	.0071416	.20595469	-.0743174	.7330101	(N)
				-.0598469	.7597338	(P)
				-.0591214	.7610018	(BC)
alpha_1	1.1141261	-.0004469	.07373228	.9696135	1.258639	(N)
				.9758891	1.263939	(P)
				.9811727	1.271331	(BC)
y3	.01694874	.0020713	.05569263	-.0922068	.1261043	(N)
				-.0839674	.1344783	(P)
				-.0831779	.1363618	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

57 .
58 . rocreg dis m1, adjcov(gender) adjmodel(stratified) regcov(currage) sregcov(currage
   >) pvcmeth(normal) nsamp(5000)

                ROC regression for markers: m1
        model intercept term covariates: currage
          model slope term covariates: currage

        percentile value calculation
                                method: normal

   Covariate adjustment for p.v. calculation:
                                method: stratified
                             covariates: Gender

        # of case-containing strata: 2

	dis		
stratum	0	1	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

        GLM fit of binormal curve
                number of points: 10
                on FPR interval: (0,1)
                link function: probit

   model coefficient bootstrap se's and CI's based on sampling
    separately from cases and controls
    and from within covariate strata

        number of bootstrap samples: 5000

****
 model results for marker: **m1**

    ROC-GLM model

Bootstrap results
Number of strata   =   **4**   Number of obs   =   **5058**
                                                      Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	-.02065859	.0594287	1.0611069	-2.10039	2.059073	(N)
				-2.027663	2.16038	(P)
				-2.086693	2.10425	(BC)
alpha_1	2.1725662	.0179759	.92112882	.3671869	3.977945	(N)
				.3873369	4.04644	(P)
				.364496	4.025946	(BC)
currage	.01261354	-.0013631	.0274967	-.041279	.0665061	(N)
				-.0432409	.0649201	(P)
				-.041776	.0676107	(BC)
s_currage	-.029267	-.0002346	.02377331	-.0758618	.0173278	(N)
				-.0773376	.0179748	(P)
				-.0762572	.0186328	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

59 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(y3) sregcov(y3) pvcmeth(normal)
 > nsamp(5000)

                    ROC regression for markers: **m1**
          model intercept term covariates: **ABR**
             model slope term covariates: **ABR**

         percentile value calculation
                                method: **normal**

    Covariate adjustment for p.v. calculation:
                                method: **linear model**
                             covariates: **TEOAE 80 at 2kHz**

             GLM fit of binormal curve
                       number of points: **10**
                     on FPR interval: **(0,1)**
                       link function: **probit**

    model coefficient bootstrap se's and CI's based on sampling
      separately from cases and controls

         number of bootstrap samples: **5000**

****
 model results for marker: **m1**

    covariate adjustment - linear model, controls only

Source	SS	df	MS
Model	78508.7841	1	78508.7841
Residual	218630.999	4907	44.5549214
Total	297139.783	4908	60.5419282

```
Number of obs =     4909
F(  1,  4907) = 1762.07
Prob > F      =   0.0000
R-squared     =   0.2642
Adj R-squared =   0.2641
Root MSE      =   6.6749
```

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

ROC-GLM model

Bootstrap results
Number of strata   =   2

```
Number of obs      =      5058
Replications       =      5000
```

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.32654965	-.0034803	.18653845	-.039059	.6921583	(N)
				-.0355112	.704529	(P)
				-.0226906	.7204918	(BC)
alpha_1	.9321602	-.0196641	.15041333	.6373555	1.226965	(N)
				.6144946	1.217891	(P)
				.6638436	1.259488	(BC)
y3	.0073482	.0012378	.0514073	-.0934083	.1081047	(N)
				-.0872058	.1185984	(P)
				-.0848434	.1199885	(BC)
s_y3	-.0817745	-.0082382	.04238354	-.1648447	.0012957	(N)
				-.1830844	-.0148534	(P)
				-.1682704	-.0026931	(BC)

```
(N)    normal confidence interval
(P)    percentile confidence interval
(BC)   bias-corrected confidence interval
```

60 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(y3) sregcov(y3) pvcmeth(empirica
> l) nsamp(5000)

```
             ROC regression for markers: m1
     model intercept term covariates: ABR
         model slope term covariates: ABR

      percentile value calculation
                          method: empirical
                  tie correction: no

 Covariate adjustment for p.v. calculation:
                          method: linear model
                       covariates: TEOAE 80 at 2kHz

        GLM fit of binormal curve
                number of points: 10
                on FPR interval: (0,1)
                   link function: probit

  model coefficient bootstrap se's and CI's based on sampling
    separately from cases and controls
```

number of bootstrap samples: **5000**

****
model results for marker: **m1**

covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	78508.7841	1	78508.7841		
Residual	218630.999	4907	44.5549214		
Total	297139.783	4908	60.5419282		

Number of obs = 4909
F(1, 4907) = 1762.07
Prob > F = 0.0000
R-squared = 0.2642
Adj R-squared = 0.2641
Root MSE = 6.6749

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
y2	.5697179	.0135721	41.98	0.000	.5431104 .5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535 -1.844061

****

ROC-GLM model

Bootstrap results
Number of strata   =   2

Number of obs   =   5058
Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.31337765	-.0056357	.19285608	-.0646133	.6913686	(N)
				-.0603754	.7022353	(P)
				-.0422738	.7237526	(BC)
alpha_1	1.018168	-.0560725	.15948686	.7055795	1.330756	(N)
				.6334997	1.273755	(P)
				.7576182	1.384572	(BC)
y3	.01214767	-.0008785	.05291544	-.0915647	.11586	(N)
				-.0832655	.1233431	(P)
				-.076604	.1333975	(BC)
s_y3	-.02969345	-.0188234	.04643474	-.1207039	.061317	(N)
				-.1533178	.03069	(P)
				-.1123866	.0506108	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

61 .
62 . // Multiple regcov, sregcov markers
63 . rocreg dis m1, adjcov(gender) adjmodel(stratified) regcov(currage y3) pvcmeth(norm
> al) nsamp(5000)

ROC regression for markers: **m1**
model intercept term covariates: **currage**
ABR

percentile value calculation
method: **normal**

Covariate adjustment for p.v. calculation:
                                     method: **stratified**
                                  covariates: **Gender**

          # of case-containing strata: **2**

| | dis | | |
stratum	0	1	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

             GLM fit of binormal curve
                      number of points: **10**
                     on FPR interval: **(0,1)**
                      link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
    separately from cases and controls
    and from within covariate strata

          number of bootstrap samples: **5000**

****
 model results for marker: **m1**

    ROC-GLM model

Bootstrap results
Number of strata   =   4   Number of obs   =   5058
                                          Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.46804166	.0945434	1.0764122	-1.641687	2.577771	(N)
				-1.576658	2.720516	(P)
				-1.75465	2.478623	(BC)
alpha_1	1.0520308	.0089317	.08210488	.8911082	1.212953	(N)
				.9103303	1.232302	(P)
				.9027846	1.222142	(BC)
currage	.00799455	-.001861	.02673931	-.0444135	.0604026	(N)
				-.0466002	.0587245	(P)
				-.0431022	.0621163	(BC)
y3	.09324431	.0074727	.0577706	-.019984	.2064726	(N)
				-.0029912	.2256171	(P)
				-.009171	.2179952	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

64 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(currage y3) pvcmeth(normal) nsam
> p(5000)

                    ROC regression for markers: **m1**
           model intercept term covariates: **currage**
                                            ABR

              percentile value calculation
                                    method: **normal**

     Covariate adjustment for p.v. calculation:
                               method: **linear model**
                            covariates: **TEOAE 80 at 2kHz**

              GLM fit of binormal curve
                      number of points: **10**
                     on FPR interval: **(0,1)**
                      link function: **probit**

     model coefficient bootstrap se's and CI's based on sampling
      separately from cases and controls

           number of bootstrap samples: **5000**

****
 model results for marker: **m1**

    covariate adjustment - linear model, controls only

Source	SS	df	MS
Model	78508.7841	1	78508.7841
Residual	218630.999	4907	44.5549214
Total	297139.783	4908	60.5419282

Number of obs =   4909
F(1, 4907) = 1762.07
Prob > F   =   0.0000
R-squared   =   0.2642
Adj R-squared =   0.2641
Root MSE   =   6.6749

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

   ROC-GLM model

Bootstrap results
Number of strata   =   2

Number of obs   =   5058
Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.14398478	.0775413	1.0762258	-1.965379	2.253349	(N)
				-1.904563	2.400339	(P)
				-2.058878	2.164142	(BC)
alpha_1	1.1885242	.0091575	.08021634	1.031303	1.345745	(N)
				1.049532	1.365096	(P)
				1.03951	1.350077	(BC)
currage	.00560316	-.0018298	.02674347	-.0468131	.0580194	(N)
				-.0501772	.056662	(P)
				-.0472952	.0587176	(BC)
y3	.01765296	.0036937	.05176473	-.083804	.11911	(N)
				-.0741318	.1286534	(P)

		-.0766894	.1271247	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

65 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(currage y3) pvcmeth(empirical) n
> samp(5000)

                    ROC regression for markers: **m1**
           model intercept term covariates: **currage**
                                            ABR

            percentile value calculation
                                  method: **empirical**
                          tie correction: **no**

     Covariate adjustment for p.v. calculation:
                                  method: **linear model**
                              covariates: **TEOAE 80 at 2kHz**

            GLM fit of binormal curve
                        number of points: **10**
                         on FPR interval: **(0,1)**
                           link function: **probit**

     model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls

           number of bootstrap samples: **5000**

****
 model results for marker: **m1**

    covariate adjustment - linear model, controls only

Source	SS	df	MS		Number of obs =	4909
					F(1, 4907) =	1762.07
Model	78508.7841	1	78508.7841		Prob > F =	0.0000
Residual	218630.999	4907	44.5549214		R-squared =	0.2642
					Adj R-squared =	0.2641
Total	297139.783	4908	60.5419282		Root MSE =	6.6749

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

    ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5058
                                         Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.08696562	.0434611	1.0632669	-1.996999	2.17093	(N)
				-1.952152	2.195725	(P)
				-2.066616	2.08888	(BC)
alpha_1	1.1140466	.0032516	.07576571	.9655485	1.262545	(N)
				.9771741	1.274399	(P)
				.9752592	1.272097	(BC)
currage	.00606679	-.0011413	.02635083	-.0455799	.0577135	(N)
				-.0465307	.0559562	(P)
				-.0440463	.0591761	(BC)
y3	.01450039	.0004202	.05596348	-.095186	.1241868	(N)
				-.0866875	.131265	(P)
				-.0830793	.1356957	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

66 .
67 . rocreg dis m1, adjcov(gender) adjmodel(stratified) regcov(currage y3) sregcov(curr
  > age y3) pvcmeth(normal) nsamp(5000)

              ROC regression for markers: **m1**
        model intercept term covariates: **currage**
                                         ABR
            model slope term covariates: **currage**
                                         ABR

        percentile value calculation
                           method: **normal**

   Covariate adjustment for p.v. calculation:
                           method: **stratified**
                        covariates: **Gender**

        # of case-containing strata: **2**

	dis		
stratum	0	1	Total
1	2,170	64	2,234
2	2,739	85	2,824
Total	4,909	149	5,058

            GLM fit of binormal curve
                 number of points: **10**
                 on FPR interval: **(0,1)**
                 link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls
     and from within covariate strata

        number of bootstrap samples: **5000**

****
 model results for marker: **m1**

    ROC-GLM model

Bootstrap results
Number of strata   =   4   Number of obs   =   5058
                                           Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.51790977	.0779085	1.1209628	-1.679137	2.714957	(N)
				-1.585894	2.856336	(P)
				-1.74959	2.677014	(BC)
alpha_1	1.3582752	-.0008371	.98182124	-.5660591	3.282609	(N)
				-.5927395	3.289933	(P)
				-.6195455	3.243959	(BC)
currage	.00478762	-.0014459	.0276757	-.0494558	.059031	(N)
				-.0512687	.0574245	(P)
				-.0495038	.0592895	(BC)
y3	.07300013	.0069989	.05820629	-.0410821	.1870824	(N)
				-.0186436	.2061828	(P)
				-.0216724	.2004128	(BC)
s_currage	-.01725956	-.0004638	.02414114	-.0645753	.0300562	(N)
				-.0649446	.0308718	(P)
				-.0615458	.0343181	(BC)
s_y3	-.11318394	-.0110423	.0504826	-.212128	-.0142399	(N)
				-.2378302	-.0397443	(P)
				-.2211529	-.029831	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

68 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(currage y3) sregcov(currage y3)
> pvcmeth(normal) nsamp(5000)

              ROC regression for markers: m1
        model intercept term covariates: currage
                                          ABR
           model slope term covariates: currage
                                          ABR

          percentile value calculation
                              method: normal

    Covariate adjustment for p.v. calculation:
                              method: linear model
                          covariates: TEOAE 80 at 2kHz

          GLM fit of binormal curve
                   number of points: 10
                   on FPR interval: (0,1)
                     link function: probit

    model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls

          number of bootstrap samples: 5000

****
 model results for marker: m1

    covariate adjustment - linear model, controls only

Source	SS	df	MS			
Model	78508.7841	1	78508.7841			
Residual	218630.999	4907	44.5549214			
Total	297139.783	4908	60.5419282			

```
Number of obs =     4909
F(  1,   4907) = 1762.07
Prob > F      =   0.0000
R-squared     =   0.2642
Adj R-squared =   0.2641
Root MSE      =   6.6749
```

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

ROC-GLM model

Bootstrap results
Number of strata   =   2

```
Number of obs     =      5058
Replications      =      5000
```

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.26374617	.0253326	1.0899283	-1.872474	2.399966	(N)
				-1.86413	2.509886	(P)
				-1.866709	2.505692	(BC)
alpha_1	2.0954242	-.1156503	.98125158	.1722064	4.018642	(N)
				.0923329	3.920477	(P)
				.3343861	4.222503	(BC)
currage	.00163022	-.0006142	.02692185	-.0511356	.0543961	(N)
				-.0533227	.0531795	(P)
				-.0529865	.0537967	(BC)
y3	.00711103	.0022772	.05229558	-.0953864	.1096085	(N)
				-.086547	.1198276	(P)
				-.085174	.1222696	(BC)
s_currage	-.02888978	.0026509	.02414058	-.0762044	.0184249	(N)
				-.0724536	.0211209	(P)
				-.0786891	.0154872	(BC)
s_y3	-.06844465	-.0082758	.04308567	-.152891	.0160017	(N)
				-.167052	.0027618	(P)
				-.1502998	.0137099	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
69 . rocreg dis m1, adjcov(y2) adjmodel(linear) regcov(currage y3) sregcov(currage y3)
> pvcmeth(empirical) nsamp(5000)
```

```
          ROC regression for markers:  m1
        model intercept term covariates:  currage
                                          ABR
          model slope term covariates:  currage
                                          ABR

          percentile value calculation
                         method:  empirical
                  tie correction:  no

     Covariate adjustment for p.v. calculation:
                         method:  linear model
                      covariates:  TEOAE 80 at 2kHz
```

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls

number of bootstrap samples: **5000**

****
model results for marker: **m1**

covariate adjustment - linear model, controls only

Source	SS	df	MS			
				Number of obs =	**4909**	
				F(1, 4907) =	**1762.07**	
Model	78508.7841	1	78508.7841	Prob > F =	0.0000	
Residual	218630.999	4907	44.5549214	R-squared =	0.2642	
				Adj R-squared =	0.2641	
Total	297139.783	4908	60.5419282	Root MSE =	6.6749	

m1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
y2	.5697179	.0135721	41.98	0.000	.5431104	.5963254
_cons	-2.208798	.1860478	-11.87	0.000	-2.573535	-1.844061

****

ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   **5058**
                                        Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.23072262	.0297245	1.0662431	-1.859075	2.320521	(N)
				-1.819802	2.36693	(P)
				-1.887766	2.320749	(BC)
alpha_1	2.2366779	-.1630096	.92128187	.4309986	4.042357	(N)
				.2970068	3.899528	(P)
				.6257551	4.291968	(BC)
currage	.00211005	-.000857	.02634314	-.0495215	.0537417	(N)
				-.0512212	.0520221	(P)
				-.0500618	.0529775	(BC)
y3	.01152698	-.0001532	.05443061	-.0951551	.118209	(N)
				-.0862761	.1290335	(P)
				-.0812972	.1379349	(BC)
s_currage	-.03033526	.0027232	.02249515	-.0744249	.0137544	(N)
				-.0721739	.0154565	(P)
				-.078045	.0107508	(BC)
s_y3	-.01666268	-.0205293	.04756878	-.1098958	.0765704	(N)
				-.1444969	.0437095	(P)
				-.0977509	.0658964	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
70 .
71 . // Multiple adjcov variables
72 . rocreg d y1, adjcov(sitenum gender) adjmodel(stratified) regcov(currage gender) sr
   > egcov(currage gender) pvcmeth(empirical) nsamp(5000)
```

                ROC regression for markers: DPOAE 65 at 2kHz
        model intercept term covariates: currage
                                         Gender
            model slope term covariates: currage
                                         Gender

          percentile value calculation
                              method: empirical
                      tie correction: no

     Covariate adjustment for p.v. calculation:
                              method: stratified
                           covariates: Site #
                                       Gender

          # of case-containing strata: 12

| | Hearing impaired | | |
stratum	no	yes	Total
1	575	9	584
2	768	11	779
3	101	4	105
4	164	4	168
5	98	7	105
6	117	5	122
7	876	26	902
8	942	40	982
9	313	7	320
10	478	21	499
11	207	11	218
12	270	4	274
Total	4,909	149	5,058

          GLM fit of binormal curve
                   number of points: 10
                   on FPR interval: (0,1)
                   link function: probit

     model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls
       and from within covariate strata

          number of bootstrap samples: 5000

    ****
     model results for marker: DPOAE 65 at 2kHz

        ROC-GLM model

Bootstrap results
Number of strata   =   24   Number of obs   =   5058
                                        Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.02985091	-.0249795	1.0018199	-1.93368	1.993382	(N)
				-1.945379	2.011868	(P)
				-1.883838	2.066984	(BC)
alpha_1	1.9488839	-.014302	.76602816	.4474963	3.450271	(N)
				.4737119	3.469426	(P)
				.503446	3.513989	(BC)
currage	.01035893	-.0000272	.02604749	-.0406932	.0614111	(N)
				-.0407701	.0612464	(P)
				-.0405124	.061431	(BC)
gender	.01007099	.021291	.17537963	-.3336668	.3538088	(N)
				-.3191068	.3692753	(P)
				-.3557128	.3382217	(BC)
s_currage	-.02628259	.0005346	.0204801	-.0664228	.0138577	(N)
				-.0664176	.0131744	(P)
				-.0683391	.0116082	(BC)
s_gender	.00633163	-.0010379	.14524348	-.2783404	.2910036	(N)
				-.2813186	.2946409	(P)
				-.2727767	.2998313	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC) bias-corrected confidence interval

73 . rocreg d y1, adjcov(sitenum gender) adjmodel(stratified) regcov(currage gender) sr
> egcov(currage gender) pvcmeth(normal) nsamp(5000)

```
           ROC regression for markers:  DPOAE 65 at 2kHz
      model intercept term covariates:  currage
                                        Gender
         model slope term covariates:  currage
                                        Gender

       percentile value calculation
                            method:  normal

   Covariate adjustment for p.v. calculation:
                            method:  stratified
                         covariates:  Site #
                                      Gender

       # of case-containing strata:  12
```

stratum	Hearing impaired no	yes	Total
1	575	9	584
2	768	11	779
3	101	4	105
4	164	4	168
5	98	7	105
6	117	5	122
7	876	26	902
8	942	40	982
9	313	7	320
10	478	21	499
11	207	11	218
12	270	4	274
Total	4,909	149	5,058

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls
and from within covariate strata

number of bootstrap samples: **5000**

****
model results for marker: **DPOAE 65 at 2kHz**

ROC-GLM model

Bootstrap results
Number of strata   =   **24**   Number of obs   =   **5058**
                                          Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	-.09858228	-.0564284	1.0211099	-2.099921	1.902756	(N)
				-2.147838	1.854534	(P)
				-2.029276	2.003873	(BC)
alpha_1	2.4734228	.1097925	.86918454	.7698524	4.176993	(N)
				.8417175	4.29893	(P)
				.6984556	4.139574	(BC)
currage	.01399137	.0018044	.0269777	-.0388839	.0668667	(N)
				-.0374007	.0688412	(P)
				-.0416567	.0649825	(BC)
gender	.01353156	-.0005382	.18509156	-.3492412	.3763044	(N)
				-.3562402	.3900588	(P)
				-.347008	.3934498	(BC)
s_currage	-.03647919	-.0032087	.02312695	-.0818072	.0088488	(N)
				-.0851763	.0059152	(P)
				-.078127	.0124866	(BC)
s_gender	-.02639868	.0188815	.16653788	-.3528069	.3000096	(N)
				-.3476345	.3232921	(P)
				-.3911662	.2817255	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

74 . rocreg d y1, adjcov(currage y3) adjmodel(linear) regcov(currage gender) sregcov(cu
> rrage gender) pvcmeth(normal) nsamp(5000)

ROC regression for markers: **DPOAE 65 at 2kHz**
model intercept term covariates: **currage**
Gender
model slope term covariates: **currage**
Gender

percentile value calculation
method: **normal**

Covariate adjustment for p.v. calculation:
method: **linear model**
covariates: **currage**
ABR

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls

number of bootstrap samples: **5000**

****
model results for marker: **DPOAE 65 at 2kHz**

covariate adjustment - linear model, controls only

Source	SS	df	MS			
Model	4437.78927	2	2218.89463	Number of obs =	4907	
				F(2, 4904) =	37.18	
Residual	292643.139	4904	59.6743759	Prob > F =	0.0000	
				R-squared =	0.0149	
				Adj R-squared =	0.0145	
Total	297080.929	4906	60.5546125	Root MSE =	7.7249	

y1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
currage	-.2030216	.0322674	-6.29	0.000	-.2662801	-.139763
y3	.3874897	.0654273	5.92	0.000	.2592229	.5157564
_cons	.3941601	1.272323	0.31	0.757	-2.100163	2.888484

****

ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5056
                                      Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	-.90566295	.0398063	1.0579154	-2.979139	1.167813	(N)
				-2.959461	1.233004	(P)
				-2.990875	1.193393	(BC)
alpha_1	2.2556787	.0320062	.92632989	.4401054	4.071252	(N)
				.4662568	4.096618	(P)
				.3168023	3.995081	(BC)
currage	.03637779	-.0009461	.02791704	-.0183386	.0910942	(N)
				-.0197354	.0911337	(P)
				-.018381	.0927205	(BC)
gender	-.03525661	.0053878	.19087908	-.4093727	.3388595	(N)
				-.4078983	.3475149	(P)
				-.4165977	.3362434	(BC)
s_currage	-.03100304	-.000296	.0241483	-.0783328	.0163268	(N)
				-.0777684	.0176677	(P)
				-.0762816	.0192141	(BC)
s_gender	-.00173124	-.0018736	.16045204	-.3162114	.312749	(N)
				-.3154465	.3097035	(P)
				-.322799	.3066654	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

75 . rocreg d y1, adjcov(currage y3) adjmodel(linear) regcov(currage gender) sregcov(cu
> rrage gender) pvcmeth(empirical) nsamp(5000)

                    ROC regression for markers: **DPOAE 65 at 2kHz**
            model intercept term covariates: **currage**
                                              Gender
                model slope term covariates: **currage**
                                              Gender

                percentile value calculation
                                      method: **empirical**
                              tie correction: **no**

        Covariate adjustment for p.v. calculation:
                                      method: **linear model**
                                  covariates: **currage**
                                              ABR

            GLM fit of binormal curve
                            number of points: **10**
                           on FPR interval: **(0,1)**
                              link function: **probit**

    model coefficient bootstrap se's and CI's based on sampling
      separately from cases and controls

          number of bootstrap samples: **5000**

    ****
     model results for marker: **DPOAE 65 at 2kHz**

        covariate adjustment - linear model, controls only

Source	SS	df	MS		
Model	4437.78927	2	2218.89463		
Residual	292643.139	4904	59.6743759		
Total	297080.929	4906	60.5546125		

	Number of obs =	4907
F(2, 4904) =	37.18
Prob > F =	0.0000
R-squared =	0.0149
Adj R-squared =	0.0145
Root MSE =	7.7249

y1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
currage	-.2030216	.0322674	-6.29	0.000	-.2662801	-.139763
y3	.3874897	.0654273	5.92	0.000	.2592229	.5157564
_cons	.3941601	1.272323	0.31	0.757	-2.100163	2.888484

    ****

    ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   5056
                                          Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	-.95284069	-.0445057	1.0452072	-3.001409	1.095728	(N)
				-3.071126	1.090389	(P)
				-2.979638	1.208576	(BC)
alpha_1	1.8521867	.0201065	.81967562	.245652	3.458721	(N)
				.2247249	3.477158	(P)
				.1822407	3.409191	(BC)
currage	.03773977	.0012803	.02761595	-.0163865	.091866	(N)
				-.0157022	.0934183	(P)
				-.0180634	.0909279	(BC)
gender	-.03654978	-.0023357	.18543206	-.3999899	.3268904	(N)
				-.4023949	.3216095	(P)
				-.4011286	.3245499	(BC)
s_currage	-.02438272	-.0002562	.0214816	-.0664859	.0177204	(N)
				-.0662605	.0184039	(P)
				-.065664	.0193852	(BC)
s_gender	.03037486	.0005483	.14480537	-.2534384	.3141882	(N)
				-.2553978	.3128649	(P)
				-.257516	.3113268	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

76 .
77 . // nostsamp
78 . rocreg d y1, adjcov(sitenum gender) adjmodel(stratified) regcov(currage) sregcov(c
> urrage) pvcmeth(empirical) nsamp(5000) nostsamp

            ROC regression for markers: **DPOAE 65 at 2kHz**
    model intercept term covariates: **currage**
       model slope term covariates: **currage**

       percentile value calculation
                         method: **empirical**
                 tie correction: **no**

   Covariate adjustment for p.v. calculation:
                         method: **stratified**
                      covariates: **Site #**
                                  Gender

       # of case-containing strata: **12**

stratum	Hearing impaired no	yes	Total
1	575	9	584
2	768	11	779
3	101	4	105
4	164	4	168
5	98	7	105
6	117	5	122
7	876	26	902
8	942	40	982
9	313	7	320
10	478	21	499
11	207	11	218
12	270	4	274
Total	4,909	149	5,058

                    GLM fit of binormal curve
                        number of points: **10**
                      on FPR interval: **(0,1)**
                        link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls
     and w/o respect to covariate strata

          number of bootstrap samples: **5000**

****
 model results for marker: **DPOAE 65 at 2kHz**

     ROC-GLM model

Bootstrap results
Number of strata   =   **2**   Number of obs   =   **5058**
                                                   Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.03977423	.0124089	1.0561799	-2.0303	2.109849	(N)
				-1.994043	2.200622	(P)
				-1.992629	2.202169	(BC)
alpha_1	1.9562364	.0006992	.84912534	.2919813	3.620491	(N)
				.3105336	3.653059	(P)
				.3191775	3.659401	(BC)
currage	.01051151	-.0001605	.02727535	-.0429472	.0639702	(N)
				-.0451023	.0632945	(P)
				-.045281	.0626451	(BC)
s_currage	-.02621426	-.0001027	.02171908	-.0687829	.0163544	(N)
				-.0688976	.0162258	(P)
				-.0687922	.0163571	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

79 . rocreg d y1, adjcov(sitenum gender) adjmodel(stratified) regcov(currage) sregcov(c
 > urrage) pvcmeth(normal) nsamp(5000) nostsamp

          ROC regression for markers: **DPOAE 65 at 2kHz**
     model intercept term covariates: **currage**
         model slope term covariates: **currage**

        percentile value calculation
                      method: **normal**

   Covariate adjustment for p.v. calculation:
                      method: **stratified**
                   covariates: **Site #**
                               Gender

        # of case-containing strata: **12**

| | Hearing impaired | | |
stratum	no	yes	Total
1	575	9	584
2	768	11	779
3	101	4	105
4	164	4	168
5	98	7	105
6	117	5	122
7	876	26	902
8	942	40	982
9	313	7	320
10	478	21	499
11	207	11	218
12	270	4	274
Total	4,909	149	5,058

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls
and w/o respect to covariate strata

number of bootstrap samples: **5000**

****
model results for marker: **DPOAE 65 at 2kHz**

ROC-GLM model

Bootstrap results
Number of strata   =   **2**   Number of obs   =   **5058**
                                          Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	-.08773423	-.0430369	1.0675671	-2.180127	2.004659	(N)
				-2.163913	2.025012	(P)
				-2.032927	2.16214	(BC)
alpha_1	2.4481773	.1104459	.97621332	.5348344	4.36152	(N)
				.5938051	4.48468	(P)
				.3729488	4.265056	(BC)
currage	.01426024	.0013054	.02763076	-.0398951	.0684155	(N)
				-.0394912	.0683527	(P)
				-.0440278	.064981	(BC)
s_currage	-.03690232	-.0025909	.02493028	-.0857648	.0119601	(N)
				-.0875749	.011114	(P)
				-.0823626	.0167661	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
80 .
81 .
82 .
83 .
84 .
85 .
86 .
87 .
88 . clear

89 . // Pancreatic cancer data set, more options
90 . use http://labs.fhcrc.org/pepe/book/data/wiedat2b
   (S. Wieand - Pancreatic cancer diagnostic marker data)

91 . //infile using "http://www.fhcrc.org/science/labs/pepe/book/data/wiedat2b.dta"
92 . rocreg d y1, tiecorr nsamp(5000)
```

                  ROC regression for markers: **CA 19-9**
                  regression model covariates: **none**

             percentile value calculation
                                   method: **empirical**
                          tie correction: **yes**

              GLM fit of binormal curve
                        number of points: **10**
                        on FPR interval: **(0,1)**
                           link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls

          number of bootstrap samples: **5000**

****
 model results for marker: **CA 19-9**

    ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   141
                                           Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	1.1940269	.0181877	.17682434	.8474576	1.540596	(N)
				.9004186	1.587837	(P)
				.8925969	1.575959	(BC)
alpha_1	.47790354	.0108829	.11486514	.252772	.7030351	(N)
				.2924457	.7337924	(P)
				.2899934	.7296416	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

93 . rocreg d y1, regcov(y2) nsamp(5000)

                         ROC regression for markers: **CA 19-9**
              model intercept term covariates: **CA 125**

                    percentile value calculation
                                         method: **empirical**
                                  tie correction: **no**

                    GLM fit of binormal curve
                              number of points: **10**
                              on FPR interval: **(0,1)**
                                  link function: **probit**

      model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls

              number of bootstrap samples: **5000**

    ****
     model results for marker: **CA 19-9**

       ROC-GLM model

Bootstrap results
Number of strata   =   **2**   Number of obs   =   **141**
                                                    Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	**1.1379178**	-.0022422	.18769549	.7700413	1.505794	(N)
				.7948294	1.536427	(P)
				.8038843	1.553283	(BC)
alpha_1	**.48026323**	.007639	.113037	.2587148	.7018117	(N)
				.2936157	.7341096	(P)
				.2966782	.7402724	(BC)
y2	**.001279**	.0004847	.00263699	-.0038894	.0064474	(N)
				-.0035459	.0078945	(P)
				-.0048143	.0068118	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

94 . rocreg d y1, regcov(y2) sregcov(y2) nsamp(5000)

                         ROC regression for markers: **CA 19-9**
              model intercept term covariates: **CA 125**
                 model slope term covariates: **CA 125**

                    percentile value calculation
                                         method: **empirical**
                                  tie correction: **no**

                    GLM fit of binormal curve
                              number of points: **10**
                              on FPR interval: **(0,1)**
                                  link function: **probit**

      model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls

              number of bootstrap samples: **5000**

****
model results for marker: **CA 19-9**

  ROC-GLM model

Bootstrap results
Number of strata   =   **2**   Number of obs   =   **141**
                                                Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf.	Interval]	
alpha_0	1.141408	-.0176541	.19179535	.765496	1.51732	(N)
				.7608667	1.516605	(P)
				.8220702	1.587131	(BC)
alpha_1	.49030876	-.0105667	.12098588	.2531808	.7274367	(N)
				.2613004	.7309977	(P)
				.2956227	.7834799	(BC)
y2	.00118271	.0011121	.00361455	-.0059017	.0082671	(N)
				-.0025727	.0106765	(P)
				-.0053385	.0073777	(BC)
s_y2	-.00026291	.000682	.0024746	-.005113	.0045872	(N)
				-.0026994	.0059085	(P)
				-.0040106	.0039748	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

95 . //test alpha_0
96 . //test alpha_1
97 . //test y2
98 . rocreg d y1, pvcmeth(normal) nsamp(5000)

            ROC regression for markers: **CA 19-9**
            regression model covariates: **none**

        percentile value calculation
                        method: **normal**

        GLM fit of binormal curve
            number of points: **10**
            on FPR interval: **(0,1)**
            link function: **probit**

  model coefficient bootstrap se's and CI's based on sampling
    separately from cases and controls

        number of bootstrap samples: **5000**

****
model results for marker: **CA 19-9**

  ROC-GLM model

Bootstrap results
Number of strata   =   **2**   Number of obs   =   **141**
                                                Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]	
alpha_0	1.1386442	.0008901	.14554291	.8533854	1.423903	(N)
				.864825	1.441525	(P)
				.8746601	1.452936	(BC)
alpha_1	.60723174	-.0274622	.07354418	.4630878	.7513757	(N)
				.42906	.7265555	(P)
				.490907	.7734787	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

99 .
100 . //Link function and interval
101 . rocreg d y1, interval(0 0.1 10) link(probit) nsamp(5000)

                 ROC regression for markers: **CA 19-9**
                regression model covariates: **none**

             percentile value calculation
                                  method: **empirical**
                          tie correction: **no**

             GLM fit of binormal curve
                        number of points: **10**
                      on FPR interval: **(0,.1)**
                        link function: **probit**

   model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls

        number of bootstrap samples: **5000**

****
 model results for marker: **CA 19-9**

    ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   **141**
                                            Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]	
alpha_0	1.1273265	-.0943807	.36408265	.4137376	1.840915	(N)
				.3534346	1.778226	(P)
				.5426374	2.030808	(BC)
alpha_1	.40370059	-.0703081	.1683862	.0736697	.7337315	(N)
				.032718	.688019	(P)
				.151241	.8410742	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

102 . rocreg d y1, link(logit) nsamp(5000)

                    ROC regression for markers: **CA 19-9**
                    regression model covariates: **none**

                    percentile value calculation
                                        method: **empirical**
                                tie correction: **no**

                    GLM fit of bilogistic curve
                            number of points: **10**
                            on FPR interval: **(0,1)**
                            link function: **logit**

        model coefficient bootstrap se's and CI's based on sampling
          separately from cases and controls

            number of bootstrap samples: **5000**

    ****
     model results for marker: **CA 19-9**

        ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   141
                                                    Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf.	Interval]	
alpha_0	2.0525882	.0323044	.33470358	1.396581	2.708595	(N)
				1.492701	2.816817	(P)
				1.476414	2.786237	(BC)
alpha_1	.52249408	.0105858	.12796999	.2716775	.7733106	(N)
				.3130628	.8121341	(P)
				.3131179	.812598	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

103 . rocreg d y1, interval(0 0.1 10) link(logit) nsamp(5000)

                    ROC regression for markers: **CA 19-9**
                    regression model covariates: **none**

                    percentile value calculation
                                        method: **empirical**
                                tie correction: **no**

                    GLM fit of bilogistic curve
                            number of points: **10**
                            on FPR interval: **(0,.1)**
                            link function: **logit**

        model coefficient bootstrap se's and CI's based on sampling
          separately from cases and controls

            number of bootstrap samples: **5000**

    ****
     model results for marker: **CA 19-9**

ROC-GLM model

Bootstrap results

| | | | | Number of obs | = | **141** |
| | | | | Replications | = | **5000** |

Number of strata = **2**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	**1.5734999**	-.0945251	.52277175	.5488861	2.598114	(N)
				.5023897	2.565998	(P)
				.6931498	2.812412	(BC)
alpha_1	.2785036	-.0443431	.11964498	.0440037	.5130034	(N)
				.0238702	.4821238	(P)
				.0942219	.5778072	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

104 .
105 . //Bootstrap options
106 . rocreg d y1, noccsamp nsamp(5000)

           ROC regression for markers: **CA 19-9**
          regression model covariates: **none**

          percentile value calculation
                               method: **empirical**
                       tie correction: **no**

          GLM fit of binormal curve
                     number of points: **10**
                      on FPR interval: **(0,1)**
                        link function: **probit**

  model coefficient bootstrap se's and CI's based on sampling
    w/o respect to case/control status

          number of bootstrap samples: **5000**

****
 model results for marker: **CA 19-9**

   ROC-GLM model

Bootstrap results

| | | | | Number of obs | = | **141** |
| | | | | Replications | = | **5000** |

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	**1.1940269**	.0076032	.17209017	.8567364	1.531317	(N)
				.883689	1.564514	(P)
				.8916158	1.572019	(BC)
alpha_1	.47790354	-.0005697	.11243092	.257543	.6982641	(N)
				.2845868	.714525	(P)
				.295238	.7398737	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
107 .
108 . //resfile
109 . gen dis = d

110 . //1 marker - create file
111 . rocreg dis y1, nsamp(5000) resfile(testResfileRocreg) replace
```

ROC regression for markers: **CA 19-9**
regression model covariates: **none**

percentile value calculation
method: **empirical**
tie correction: **no**

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
separately from cases and controls

number of bootstrap samples: **5000**

****
model results for marker: **CA 19-9**

ROC-GLM model

Bootstrap results
Number of strata   =   **2**   Number of obs   =   **141**
                                             Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	1.1940269	.0132343	.17353014	.8539141	1.53414	(N)
				.8971814	1.580145	(P)
				.892075	1.574381	(BC)
alpha_1	.47790354	.0047194	.11227295	.2578526	.6979545	(N)
				.284328	.7283806	(P)
				.2900825	.7416607	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
112 . //1 marker - Try to overwrite existing file
113 . //rocreg dis y2, nsamp(5000) resfile(testResfileRocreg)
114 . //Multiple markers
115 . rocreg dis y1 y2, nsamp(5000) resfile(testResfileRocreg) replace
```

ROC regression for markers: **CA 19-9**
                            CA 125
regression model covariates: **none**

percentile value calculation
method: **empirical**
tie correction: **no**

GLM fit of binormal curve
number of points: **10**
on FPR interval: **(0,1)**
link function: **probit**

model coefficient bootstrap se's and CI's based on sampling
  separately from cases and controls

number of bootstrap samples: **5000**

****
 model results for marker: **CA 19-9**

   ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   **141**
                                            Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	1.1940269	.0139355	.17343255	.8541054	1.533949	(N)
				.895675	1.573885	(P)
				.8837537	1.554588	(BC)
alpha_1	.47790354	.007351	.11378785	.2548835	.7009236	(N)
				.2939091	.739929	(P)
				.2998568	.7568095	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

****
 model results for marker: **CA 125**

   ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   **141**
                                            Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	.78897005	-.0089115	.19915662	.3986303	1.17931	(N)
				.4017272	1.182553	(P)
				.428745	1.210367	(BC)
alpha_1	1.0023121	.0420035	.19712461	.6159549	1.388669	(N)
				.6971828	1.46865	(P)
				.6519752	1.391133	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
116 . //Multiple markers - Try to overwrite existing file
117 . //rocreg dis y1 y2, nsamp(5000) resfile(testResfileRocreg)
118 .
119 .
120 .
121 . clear

122 . // Ovarian Cancer dataset
123 . use http://labs.fhcrc.org/pepe/book/data/ocdata_b
    (simulated ovarian cancer marker data)

124 . //infile using "http://www.fhcrc.org/science/labs/pepe/book/data/ocdata_b.dta"
125 . rocreg d y1 y2 nsamp(5000)
    factor variables and time-series operators not allowed
    r(101);

    end of do-file

    r(101);

126 . do "C:\DOCUME~1\demorris\LOCALS~1\Temp\STD01000000.tmp"

127 . set trace on

128 . rocreg d y1 y2 nsamp(5000)
    _____
    > ———— begin rocreg ————————————————————————————————
    - version 10
    - if !replay() {
    - syntax varlist(min=2 numeric) [if] [in], [ LInk(name) noBStrap REGCov(varlist nu
    > meric) SREGCov(varlist numeric) NSamp(integer 1000) noCCSamp CLuster(varlist) noST
    > Samp TIECorr PVCMeth(string) INTerval(numlist min=3 max=3) level(cilevel) ADJCov(v
    > arlist numeric) ADJModel(string) RESfile(string) REPLACE ]
    factor variables and time-series operators not allowed
        preserve
        tempvar st_sort_id
        gen `st_sort_id' = _n
        gettoken d mlist : varlist
        tokenize `mlist'
        local y1 "`1'"
        local i = 2
        local nmark = 1
        marksample touse, nov
        markout `touse' `d' `adjcov'
        local nregcov = wordcount("`regcov'")
        if `nregcov' ~= 0 {
        foreach var of varlist `regcov' {
        qui replace `touse' = 0 if missing(`var') & `d'==1
        }
        }
        local nsregcov = wordcount("`sregcov'")
        if `nsregcov' ~= 0 {
        foreach var of varlist `sregcov' {
        qui replace `touse' = 0 if missing(`var') & `d'==1
        }
        }
        while "``i''" ~= "" {
        local ++nmark
        local y`nmark' "``i''"
        local ++i
        }
        if `nsamp' == 0 {
        local bstrap nobstrap
        }
        else {
        cap assert `nsamp' > 1
        if _rc~=0 {
```

```
di in red "argument for nsamp() option must be integer > 1"
exit 198
}
}
qui ta `d' if `touse'
if r(r) ~= 2 {
di in red "`d' must take on two values"
exit 198
}
qui sum `d' if `touse', meanonly
if r(min) ~= 0 | r(max) ~= 1 {
di in red "`d' must be 0/1"
exit 198
}
cap assert inlist("`link'","probit","logit","")
if _rc ~= 0 {
di in red `"LInk( ) option must be either "probit" or "logit" "'
di "     if specified"
error 198
}
if "`link'" == "" local link "probit"
cap assert inlist("`pvcmeth'","empirical","normal","")
if _rc ~= 0 {
di in red `"PVCmeth( ) option must be either "empirical" or "normal" "'
di "     if specified"
error 198
}
if "`pvcmeth'" == "" local pvcmeth "empirical"
if "`interval'" ~= "" {
local a = word("`interval'", 1)
local b = word("`interval'", 2)
local np = word("`interval'", 3)
if ~( inrange(`a',0,1) & inrange(`b',0,1) ) {
di "{err} first 2 interval arguments, a & b, must be between 0 & 1 "
exit 198
}
if `b' <= `a' {
di "{err} interval arguments must satisfy a < b "
exit 198
}
cap confirm integer number `np'
if ~(_rc==0 & `np' > 0) {
di "{err} 3rd interval argument, np, must be a positive integer"
exit 198
}
}
else {
local a = 0
local b = 1
local np = 10
}
local adjust = ("`adjcov'" ~= "")
tempvar stratn instratn casestrat
if `adjust' {
if "`adjmodel'" ~= "" {
local adjmodel = lower(substr("`adjmodel'",1,4))
if ~inlist("`adjmodel'","stra","line") {
di in red "argument to adjmodel( ) option, if specified,"
di `"   must be either "LINEar" or "STRAtified" (minimal abbrev in caps)"'
exit 198
}
}
else {
local adjmodel "stra"
}
if "`adjmodel'" == "stra" {
qui {
```

```
bys `touse' `adjcov' (`d'): gen `casestrat' = (`d'[_N] == 1) & `touse'
bys `touse' `adjcov': gen int `stratn' = _n==1 if `casestrat'==1 & `touse'
replace `stratn' = sum(`stratn') if `casestrat'==1 & `touse'
bys `stratn': gen `instratn' = sum(`d'==0) if `casestrat'==1 & `touse'
bys `stratn': replace `instratn' = `instratn'[_N] if `casestrat'==1 & `touse'
qui sum `stratn', meanonly
local nstrat = r(max)
sum `instratn', meanonly
local control_min = r(min)
}
if `control_min' < 2 {
di in red "fewer than 2 controls in some case-containing strata"
di in red "   defined by: `adjcov' "
di in red "need to redefine/broaden adjustment strata specified by adjcov()"
exit
}
else if `control_min' < 10 {
di in yel "warning:
di in yel "  fewer than 10 controls in some case-containing strata"
di in yel "  defined by stratification variables: `adjcov' "
}
local getpcvopts "nstrat(`nstrat') stratn(`stratn')"
}
local getpcvopts "`getpcvopts' adjmodel(`adjmodel') adjcov(`adjcov')"
}
local xlist ""
local ylist ""
local mlablist ""
local betas ""
tokenize `regcov'
forvalues i = 1/`nregcov' {
local betas "`betas' ``i''"
}
local sbetas ""
tokenize `sregcov'
forvalues i = 1/`nsregcov' {
local sbetas "`sbetas' s_``i''"
}
if "`resfile'"!="" local ressave yes
if "`replace'"!="" local replacm ",`replace'"
forvalues i = 1/`nmark' {
tempname pf`i'
local pflist "`pflist' `pf`i''"
if "`resfile'"=="" {
tempfile resfile`i'
}
else {
if `nmark' == 1 {
local resfile`i' `resfile'
}
else {
local resfile`i' `resfile'`i'
}
}
postfile `pf`i'' alpha_0 alpha_1 `betas' `sbetas' using `resfile`i'' `replacm'
}
if "`regcov'" != "" {
local regcovarg "regcov(`regcov')"
}
if "`sregcov'" != "" {
local sregcovarg "sregcov(`sregcov')"
}
if "`cluster'" ~= "" {
local clusterarg cluster(`cluster')
}
glmbs if `touse', nmark(`nmark') mlist(`mlist') d(`d') nsamp(`nsamp') `ccsamp' p
> flist(`pflist') `bstrap' adjust(`adjust') pvcmeth(`pvcmeth') st_sort_id(`st_sort_i
```

```
> d') b(`b') a(`a') np(`np') link(`link') nregcov(`nregcov') `regcovarg' nsregcov(`n
> sregcov') `sregcovarg' `stsamp' `tiecorr' `getpcvopts' level(`level') `clusterarg'
        local nclust `r(nclust)'
        local nstratbs `r(nstrat)'
        local stratvbs `r(stratv)'
        local nobs `r(nobs)'
        displres, nmark(`nmark') mlist(`mlist') d(`d') a(`a') b(`b') np(`np') link(`link
> ') nsamp(`nsamp') level(`level') `bstrap' adjust(`adjust') pvcmeth(`pvcmeth') `get
> pcvopts' `ccsamp' `stsamp' `tiecorr' nregcov(`nregcov') `regcovarg' nsregcov(`nsre
> gcov') `sregcovarg'
        forvalues i = 1/`nmark' {
        if "`:variable label `y`i'''" == "" {
        local m`i'lab "`y`i''"
        }
        else {
        local m`i'lab "`:variable label `y`i'''"
        }
        local rownames "`rownames'`y`i'' "
        }
        local colnames "alpha_0 alpha_1 `betas' `sbetas'"
        local ncol = wordcount("`colnames'")
        tempname GLMparm
        mat `GLMparm' = J(`nmark',`ncol',.)
        matrix rownames `GLMparm' = `rownames'
        matrix colnames `GLMparm' = `colnames'
        forvalues i = 1/`nmark' {
        postclose `pf`i''
        if "`bstrap'" == ""{
        qui use `resfile`i'', clear
        char _dta[bs_version] 3
        char _dta[N_cluster] `nclust'
        char _dta[cluster] `cluster'
        char _dta[strata] `stratvbs'
        char _dta[N_strata] `nstratbs'
        char _dta[N] `nobs'
        local j = 1
        foreach var of varlist * {
        char `var'[observed] "`=`var'[1]'"
        matr `GLMparm'[`i',`j'] == `var'[1]
        local ++j
        }
        qui drop in 1
        la data "-rocreg- ROC GLM bootstrap results for marker: `m`i'lab'"
        qui save `resfile`i'', replace
        }
        di
        di as txt "*****************************"
        di as txt " model results for marker: {res:`m`i'lab'}"
        di
        if `adjust' & ("`adjmodel'" == "line") {
        di as txt "    covariate adjustment - linear model, controls only"
        di
        estimates replay ladj`i', noheader
        qui estimates drop ladj`i'
        di
        di as txt "************"
        di
        }
        di as txt "    ROC-GLM model"
        if "`bstrap'" == "" {
        qui bstat using `resfile`i'', level(`level')
        estat bootstrap, all
        di
        ereturn local cmd "rocreg"
        ereturn local test_varname "`m`i'lab'"
        if `nmark' > 1 {
        estimates store rocreg_m`i'
```

```
      }
      }
      else {
      ereturn clear
      qui use `resfile`i'', clear
      di
      di in g "          model term  {c |}  coefficient    "
      di in g "{hline 24}{c +}{hline 13}"
      local j = 1
      foreach var of varlist * {
      di as res "{ralign 22:`=substr("`var'",1,20)'}" _col(25) as txt "{c |}" as res "
>       " %9.0g `var'[1]
      matr `GLMparm'[`i',`j'] == `var'[1]
      local ++j
      }
      di
      ereturn local cmd "rocreg_no_bs"
      }
      }
      ereturn matrix GLMparm = `GLMparm'
      }
```
> ———————— end rocreg ——

r(101);

end of do-file

r(101);

129 . log off
            name: <unnamed>
             log: C:\Documents and Settings\demorris\Desktop\Untitled.smcl
        log type: smcl
       paused on: 3 Dec 2009, 13:15:39

──

            name: <unnamed>
             log: C:\Documents and Settings\demorris\Desktop\Untitled.smcl
        log type: smcl
      resumed on: 3 Dec 2009, 13:23:07

130 . do "C:\DOCUME~1\demorris\LOCALS~1\Temp\STD01000000.tmp"

131 . rocreg d y1 y2, nsamp(5000)

                  ROC regression for markers: y1
                                               y2
                  regression model covariates: none

              percentile value calculation
                                    method: empirical
                            tie correction: no

              GLM fit of binormal curve
                        number of points: 10
                        on FPR interval: (0,1)
                          link function: probit

    model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls

            number of bootstrap samples: 5000

    ****
     model results for marker: y1

ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   **1200**
                                               Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf.	Interval]	
alpha_0	1.0229493	.0050861	.09899407	.8289245	1.216974	(N)
				.8423509	1.230598	(P)
				.8352454	1.223974	(BC)
alpha_1	.95349401	.0086255	.08201908	.7927396	1.114248	(N)
				.8112394	1.132	(P)
				.7984776	1.116373	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

****
 model results for marker: **y2**

   ROC-GLM model

Bootstrap results
Number of strata   =   2   Number of obs   =   **1200**
                                               Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf.	Interval]	
alpha_0	2.1717277	.060921	.18619313	1.806796	2.536659	(N)
				1.919745	2.646913	(P)
				1.855067	2.517122	(BC)
alpha_1	1.1911912	.0523118	.14841299	.9003071	1.482075	(N)
				.9903031	1.575384	(P)
				.9397041	1.461182	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

132 . rocreg d y1, tiecorr pvcmeth(empirical) nsamp(5000)

                ROC regression for markers: **y1**
              regression model covariates: **none**

          percentile value calculation
                             method: **empirical**
                      tie correction: **yes**

          GLM fit of binormal curve
                    number of points: **10**
                    on FPR interval: **(0,1)**
                      link function: **probit**

    model coefficient bootstrap se's and CI's based on sampling
      separately from cases and controls

          number of bootstrap samples: **5000**

```
*****************************
 model results for marker: y1

   ROC-GLM model
```

Bootstrap results
Number of strata   =   2   Number of obs   =   1200
                                               Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	1.0229493	.0023266	.09976585	.8274119	1.218487	(N)
				.8370609	1.23355	(P)
				.8390612	1.239199	(BC)
alpha_1	.95349401	.0076548	.08192809	.7929179	1.11407	(N)
				.8140585	1.133955	(P)
				.8054103	1.1204	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

133 . rocreg d y1, link(logit) nsamp(5000)

```
                    ROC regression for markers: y1
                   regression model covariates: none

                  percentile value calculation
                                       method: empirical
                               tie correction: no

                  GLM fit of bilogistic curve
                             number of points: 10
                             on FPR interval: (0,1)
                               link function: logit

     model coefficient bootstrap se's and CI's based on sampling
       separately from cases and controls

          number of bootstrap samples: 5000

*****************************
 model results for marker: y1

   ROC-GLM model
```

Bootstrap results
Number of strata   =   2   Number of obs   =   1200
                                               Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	1.7820263	.0048346	.1856827	1.418095	2.145958	(N)
				1.440298	2.169534	(P)
				1.443645	2.178637	(BC)
alpha_1	1.0084903	.0049796	.09009641	.8319046	1.185076	(N)
				.8484595	1.203785	(P)
				.8491188	1.204887	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

```
134 .
135 .
136 . clear

137 . // Daryl error - CIs don't contain estimate
138 . //use http://labs.fhcrc.org/pepe/book/data/sj_ms2_fig1_scen1b
139 . use http://labs.fhcrc.org/pepe/dabs/sj_ms2_fig1_scen1b
    (simulated data for fig 1, scenario 1, SJ article. see -notes-)

140 . //infile using "http://labs.fhcrc.org/pepe/dabs/sj_ms2_fig1_scen1b.dta", clear
141 . rocreg d y, level(95) nsamp(5000)
```

                    ROC regression for markers: **marker**
                    regression model covariates: **none**

              percentile value calculation
                                   method: **empirical**
                           tie correction: **no**

              GLM fit of binormal curve
                           number of points: **10**
                            on FPR interval: **(0,1)**
                             link function: **probit**

    model coefficient bootstrap se's and CI's based on sampling
      separately from cases and controls

              number of bootstrap samples: **5000**

    ****
     model results for marker: **marker**

        ROC-GLM model

    Bootstrap results
    Number of strata   =   **2**   Number of obs   =   **20000**
                                                     Replications   =   **5000**

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	1.551726	-.000418	.01972018	1.513075	1.590377	(N)
				1.513029	1.590125	(P)
				1.514526	1.590912	(BC)
alpha_1	.89973152	-.0016979	.0164174	.867554	.931909	(N)
				.8655274	.9303617	(P)
				.8692371	.9329569	(BC)

    (N)   normal confidence interval
    (P)   percentile confidence interval
    (BC)   bias-corrected confidence interval

142 . rocreg d y, level(95) nsamp(5000) adjcov(z) adjmodel(stratified)

                    ROC regression for markers: **marker**
                    regression model covariates: **none**

                percentile value calculation
                                  method: **empirical**
                          tie correction: **no**

        Covariate adjustment for p.v. calculation:
                                  method: **stratified**
                              covariates: **covariate**

            # of case-containing strata: **2**

		outcome	
stratum	0	1	Total
1	8,991	5,096	14,087
2	1,009	4,904	5,913
Total	10,000	10,000	20,000

                GLM fit of binormal curve
                        number of points: **10**
                       on FPR interval: **(0,1)**
                          link function: **probit**

    model coefficient bootstrap se's and CI's based on sampling
     separately from cases and controls
     and from within covariate strata

            number of bootstrap samples: **5000**

****
 model results for marker: **marker**

   ROC-GLM model

Bootstrap results
Number of strata   =   4   Number of obs   =   20000
                                           Replications   =   5000

	Observed Coef.	Bias	Bootstrap Std. Err.	[95% Conf. Interval]		
alpha_0	1.3098444	.0009763	.02289453	1.264972	1.354717	(N)
				1.266843	1.357792	(P)
				1.265399	1.356117	(BC)
alpha_1	.99029398	-.0014899	.02081321	.9495008	1.031087	(N)
				.9477156	1.029612	(P)
				.9501641	1.031564	(BC)

(N)   normal confidence interval
(P)   percentile confidence interval
(BC)   bias-corrected confidence interval

143 .
    end of do-file

144 . log close
         name: <unnamed>
          log: C:\Documents and Settings\demorris\Desktop\Untitled.smcl
     log type: smcl
    closed on: 3 Dec 2009, 15:47:06