# Main effects RPL model for bovines and ovines

Bo**vines:**

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# RPL for Bovine

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CALC;Ran(12345)$

Error: 1: Unrecognized command. (Missing ; ?)

|-> NLOGIT

;lhs=choice

;choices=alt1,alt2,alt3

;rpl

;fcn=bcl(n),bss(n),bsos(n),bcost(t),bsq(n)

;Halton

;pds=4

;pts=1000

;Parameters

;Model:

U(alt1)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt2)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt3)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost$

Normal exit: 5 iterations. Status=0, F= 404.9809

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Start values obtained using MNL model

Dependent variable Choice

Log likelihood function -404.98093

Estimation based on N = 464, K = 5

Inf.Cr.AIC = 820.0 AIC/N = 1.767

Model estimated: Jun 02, 2018, 12:32:47

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

Constants only -501.9318 .1932 .1844

Response data are given as ind. choices

Number of obs.= 464, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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BCL| -.27665\*\*\* .06717 -4.12 .0000 -.40829 -.14501

BSS| .05906 .07861 .75 .4525 -.09501 .21313

BSOS| -.42577\*\*\* .07901 -5.39 .0000 -.58063 -.27092

BCOST| .01317\*\*\* .00118 11.19 .0000 .01086 .01547

BSQ| 1.09419\*\*\* .17680 6.19 .0000 .74767 1.44072

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

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Normal exit: 30 iterations. Status=0, F= 356.7375

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Random Parameters Logit Model

Dependent variable CHOICE

Log likelihood function -356.73750

Restricted log likelihood -509.75610

Chi squared [ 10 d.f.] 306.03720

Significance level .00000

McFadden Pseudo R-squared .3001800

Estimation based on N = 464, K = 10

Inf.Cr.AIC = 733.5 AIC/N = 1.581

Model estimated: Jun 02, 2018, 12:41:32

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

No coefficients -509.7561 .3002 .2926

Constants only -501.9318 .2893 .2815

At start values -404.9809 .1191 .1095

Response data are given as ind. choices

Replications for simulated probs. =1000

Halton sequences used for simulations

RPL model with panel has 116 groups

Fixed number of obsrvs./group= 4

Number of obs.= 464, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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|Random parameters in utility functions

BCL| -.91885\*\*\* .19137 -4.80 .0000 -1.29393 -.54376

BSS| -.28535 .21238 -1.34 .1791 -.70160 .13091

BSOS| -.60613\*\* .23938 -2.53 .0113 -1.07530 -.13696

BCOST| .02541\*\*\* .00367 6.93 .0000 .01822 .03260

BSQ| 2.64677\*\*\* .53144 4.98 .0000 1.60516 3.68838

|Distns. of RPs. Std.Devs or limits of triangular

NsBCL| .57545\* .29595 1.94 .0518 -.00460 1.15551

NsBSS| 1.12133\*\*\* .27421 4.09 .0000 .58389 1.65877

NsBSOS| 1.86187\*\*\* .34414 5.41 .0000 1.18737 2.53636

TsBCOST| .01006 .01070 .94 .3473 -.01092 .03103

NsBSQ| 1.93398\*\*\* .39022 4.96 .0000 1.16917 2.69879

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

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**Ovines:**

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# RPL for Ovine

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CALC;Ran(12345)$

Error: 1: Unrecognized command. (Missing ; ?)

|-> NLOGIT

;lhs=choice

;choices=alt1,alt2,alt3

;rpl

;fcn=bcl(n),bss(n),bsos(n),bcost(t),bsq(n)

;Halton

;pds=4

;pts=1000

;Parameters

;Model:

U(alt1)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt2)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt3)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost$

Normal exit: 5 iterations. Status=0, F= 271.7672

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Start values obtained using MNL model

Dependent variable Choice

Log likelihood function -271.76724

Estimation based on N = 324, K = 5

Inf.Cr.AIC = 553.5 AIC/N = 1.708

Model estimated: Jun 02, 2018, 12:24:05

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

Constants only -347.1816 .2172 .2049

Response data are given as ind. choices

Number of obs.= 324, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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BCL| -.45315\*\*\* .08966 -5.05 .0000 -.62889 -.27742

BSS| -.22360\*\* .11124 -2.01 .0444 -.44162 -.00558

BSOS| -.31091\*\*\* .10558 -2.94 .0032 -.51783 -.10398

BCOST| .24479\*\*\* .02960 8.27 .0000 .18677 .30282

BSQ| .98196\*\*\* .22201 4.42 .0000 .54683 1.41710

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

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Normal exit: 26 iterations. Status=0, F= 243.7296

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Random Parameters Logit Model

Dependent variable CHOICE

Log likelihood function -243.72959

Restricted log likelihood -355.95038

Chi squared [ 10 d.f.] 224.44158

Significance level .00000

McFadden Pseudo R-squared .3152709

Estimation based on N = 324, K = 10

Inf.Cr.AIC = 507.5 AIC/N = 1.566

Model estimated: Jun 02, 2018, 12:28:59

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

No coefficients -355.9504 .3153 .3045

Constants only -347.1816 .2980 .2870

At start values -271.7672 .1032 .0891

Response data are given as ind. choices

Replications for simulated probs. =1000

Halton sequences used for simulations

RPL model with panel has 81 groups

Fixed number of obsrvs./group= 4

Number of obs.= 324, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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|Random parameters in utility functions

BCL| -.97506\*\*\* .21946 -4.44 .0000 -1.40520 -.54493

BSS| -.54829\*\* .21328 -2.57 .0101 -.96631 -.13027

BSOS| -.47230\* .25404 -1.86 .0630 -.97021 .02562

BCOST| .42112\*\*\* .07076 5.95 .0000 .28243 .55981

BSQ| 2.11988\*\*\* .52919 4.01 .0001 1.08270 3.15707

|Distns. of RPs. Std.Devs or limits of triangular

NsBCL| .64135\*\* .29997 2.14 .0325 .05342 1.22928

NsBSS| .56532\* .32575 1.74 .0827 -.07315 1.20379

NsBSOS| 1.59387\*\*\* .31505 5.06 .0000 .97639 2.21136

TsBCOST| .06075 .25917 .23 .8147 -.44722 .56871

NsBSQ| 1.41544\*\*\* .38557 3.67 .0002 .65973 2.17115

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

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# Interacted RPL model for bovines and ovines

**Bovines (inc covariates):**

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# RPL for Bovine (inc. covariates)

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CALC;Ran(12345)$

Error: 1: Unrecognized command. (Missing ; ?)

|-> NLOGIT

;lhs=choice

;choices=alt1,alt2,alt3

;rpl=amed,benefit1,benefit3,age1,age3,edu1,edu3,tin1

;fcn=bcl(n|#00000000),bss(n|#10000000),bsos(n|#00000000),bcost(t|#00100000),bsq(n|#10000000)

;Halton

;pds=4

;pts=1000

;wtp=bcl/bcost,bss/bcost,bsos/bcost,bsq/bcost

;parameters

;Model:

U(alt1)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt2)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt3)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost$

Normal exit: 5 iterations. Status=0, F= 405.2521

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Start values obtained using MNL model

Dependent variable Choice

Log likelihood function -405.25213

Estimation based on N = 464, K = 5

Inf.Cr.AIC = 820.5 AIC/N = 1.768

Model estimated: May 30, 2018, 16:31:24

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

Constants only -501.9318 .1926 .1811

Response data are given as ind. choices

Number of obs.= 464, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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

BCL| -.27863\*\*\* .06715 -4.15 .0000 -.41025 -.14701

BSS| .05960 .07859 .76 .4482 -.09443 .21364

BSOS| -.42579\*\*\* .07900 -5.39 .0000 -.58063 -.27096

BCOST| .01303\*\*\* .00117 11.17 .0000 .01074 .01531

BSQ| 1.08903\*\*\* .17651 6.17 .0000 .74308 1.43499

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

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Normal exit: 20 iterations. Status=0, F= 344.0885

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Random Parameters Logit Model

Dependent variable CHOICE

Log likelihood function -344.08853

Restricted log likelihood -509.75610

Chi squared [ 13 d.f.] 331.33515

Significance level .00000

McFadden Pseudo R-squared .3249938

Estimation based on N = 464, K = 13

Inf.Cr.AIC = 714.2 AIC/N = 1.539

Model estimated: May 30, 2018, 16:36:06

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

No coefficients -509.7561 .3250 .3154

Constants only -501.9318 .3145 .3047

At start values -363.6682 .0538 .0404

Response data are given as ind. choices

Replications for simulated probs. =1000

Halton sequences used for simulations

RPL model with panel has 116 groups

Fixed number of obsrvs./group= 4

Number of obs.= 464, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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|Random parameters in utility functions

BCL| -.82878\*\*\* .17468 -4.74 .0000 -1.17114 -.48642

BSS| .14663 .23021 .64 .5242 -.30458 .59784

BSOS| -.55351\*\* .22057 -2.51 .0121 -.98582 -.12119

BCOST| .02277\*\*\* .00336 6.78 .0000 .01619 .02935

BSQ| 1.89970\*\*\* .51559 3.68 .0002 .88915 2.91024

|Heterogeneity in mean, Parameter:Variable

BCL:AME| 0.0 .....(Fixed Parameter).....

BCL:BEN| 0.0 .....(Fixed Parameter).....

BCL0:BEN| 0.0 .....(Fixed Parameter).....

BCL:AGE| 0.0 .....(Fixed Parameter).....

BCL0:AGE| 0.0 .....(Fixed Parameter).....

BCL:EDU| 0.0 .....(Fixed Parameter).....

BCL0:EDU| 0.0 .....(Fixed Parameter).....

BCL:TIN| 0.0 .....(Fixed Parameter).....

BSS:AME| -.98055\*\*\* .37376 -2.62 .0087 -1.71310 -.24800

BSS:BEN| 0.0 .....(Fixed Parameter).....

BSS0:BEN| 0.0 .....(Fixed Parameter).....

BSS:AGE| 0.0 .....(Fixed Parameter).....

BSS0:AGE| 0.0 .....(Fixed Parameter).....

BSS:EDU| 0.0 .....(Fixed Parameter).....

BSS0:EDU| 0.0 .....(Fixed Parameter).....

BSS:TIN| 0.0 .....(Fixed Parameter).....

BSOS:AME| 0.0 .....(Fixed Parameter).....

BSOS:BEN| 0.0 .....(Fixed Parameter).....

BSO0:BEN| 0.0 .....(Fixed Parameter).....

BSOS:AGE| 0.0 .....(Fixed Parameter).....

BSO0:AGE| 0.0 .....(Fixed Parameter).....

BSOS:EDU| 0.0 .....(Fixed Parameter).....

BSO0:EDU| 0.0 .....(Fixed Parameter).....

BSOS:TIN| 0.0 .....(Fixed Parameter).....

BCOS:AME| 0.0 .....(Fixed Parameter).....

BCOS:BEN| 0.0 .....(Fixed Parameter).....

BCO0:BEN| .01566\*\*\* .00574 2.73 .0064 .00441 .02691

BCOS:AGE| 0.0 .....(Fixed Parameter).....

BCO0:AGE| 0.0 .....(Fixed Parameter).....

BCOS:EDU| 0.0 .....(Fixed Parameter).....

BCO0:EDU| 0.0 .....(Fixed Parameter).....

BCOS:TIN| 0.0 .....(Fixed Parameter).....

BSQ:AME| 1.68057\*\*\* .50926 3.30 .0010 .68244 2.67869

BSQ:BEN| 0.0 .....(Fixed Parameter).....

BSQ0:BEN| 0.0 .....(Fixed Parameter).....

BSQ:AGE| 0.0 .....(Fixed Parameter).....

BSQ0:AGE| 0.0 .....(Fixed Parameter).....

BSQ:EDU| 0.0 .....(Fixed Parameter).....

BSQ0:EDU| 0.0 .....(Fixed Parameter).....

BSQ:TIN| 0.0 .....(Fixed Parameter).....

|Distns. of RPs. Std.Devs or limits of triangular

NsBCL| .50059 .31077 1.61 .1072 -.10850 1.10969

NsBSS| 1.02243\*\*\* .26142 3.91 .0001 .51006 1.53480

NsBSOS| 1.68880\*\*\* .32361 5.22 .0000 1.05454 2.32306

TsBCOST| .00649 .01209 .54 .5911 -.01720 .03019

NsBSQ| 1.67482\*\*\* .35791 4.68 .0000 .97333 2.37631

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

Fixed parameter ... is constrained to equal the value or

had a nonpositive st.error because of an earlier problem.

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Parameter Matrix for Heterogeneity in Means.



|-> MATRIX ;list;1/116\*1'wtp\_i$

Result| 1 2 3 4

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1| -35.1907 -10.4569 -25.5468 106.804

**Sheep RPL model (inc. covariates):**

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# RPL for Sheep (inc. covariates)

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CALC;Ran(12345)$

Error: 1: Unrecognized command. (Missing ; ?)

|-> NLOGIT

;lhs=choice

;choices=alt1,alt2,alt3

;rpl=amed,benefit1,edu1,tin1

;fcn=bcl(n|#0000),bss(n|#1001),bsos(n|#0100),bcost(t|#1100),bsq(n|#0000)

;Halton

;pds=4

;pts=1000

;wtp=bcl/bcost,bss/bcost,bsos/bcost,bsq/bcost

;parameters

;Model:

U(alt1)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt2)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost/

U(alt3)=bsq\*sq+bcl\*cl+bss\*ss+bsos\*sos+bcost\*cost$

Normal exit: 5 iterations. Status=0, F= 271.7672

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Start values obtained using MNL model

Dependent variable Choice

Log likelihood function -271.76724

Estimation based on N = 324, K = 5

Inf.Cr.AIC = 553.5 AIC/N = 1.708

Model estimated: May 30, 2018, 17:56:13

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

Constants only -347.1816 .2172 .1987

Response data are given as ind. choices

Number of obs.= 324, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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BCL| -.45315\*\*\* .08966 -5.05 .0000 -.62889 -.27742

BSS| -.22360\*\* .11124 -2.01 .0444 -.44162 -.00558

BSOS| -.31091\*\*\* .10558 -2.94 .0032 -.51783 -.10398

BCOST| .24479\*\*\* .02960 8.27 .0000 .18677 .30282

BSQ| .98196\*\*\* .22201 4.42 .0000 .54683 1.41710

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

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Normal exit: 24 iterations. Status=0, F= 222.2457

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Random Parameters Logit Model

Dependent variable CHOICE

Log likelihood function -222.24567

Restricted log likelihood -355.95038

Chi squared [ 15 d.f.] 267.40942

Significance level .00000

McFadden Pseudo R-squared .3756274

Estimation based on N = 324, K = 15

Inf.Cr.AIC = 474.5 AIC/N = 1.464

Model estimated: May 30, 2018, 18:02:45

R2=1-LogL/LogL\* Log-L fncn R-sqrd R2Adj

No coefficients -355.9504 .3756 .3608

Constants only -347.1816 .3599 .3447

At start values -301.4487 .2627 .2453

Response data are given as ind. choices

Replications for simulated probs. =1000

Halton sequences used for simulations

RPL model with panel has 81 groups

Fixed number of obsrvs./group= 4

Number of obs.= 324, skipped 0 obs

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| Standard Prob. 95% Confidence

CHOICE| Coefficient Error z |z|>Z\* Interval

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|Random parameters in utility functions

BCL| -.98416\*\*\* .21346 -4.61 .0000 -1.40253 -.56579

BSS| .06187 .25933 .24 .8115 -.44642 .57015

BSOS| 1.49893\*\*\* .46565 3.22 .0013 .58627 2.41160

BCOST| .59425\*\*\* .10819 5.49 .0000 .38219 .80630

BSQ| 2.08775\*\*\* .49208 4.24 .0000 1.12329 3.05221

|Heterogeneity in mean, Parameter:Variable

BCL:AME| 0.0 .....(Fixed Parameter).....

BCL:BEN| 0.0 .....(Fixed Parameter).....

BCL:EDU| 0.0 .....(Fixed Parameter).....

BCL:TIN| 0.0 .....(Fixed Parameter).....

BSS:AME| -.78213\*\* .34573 -2.26 .0237 -1.45975 -.10452

BSS:BEN| 0.0 .....(Fixed Parameter).....

BSS:EDU| 0.0 .....(Fixed Parameter).....

BSS:TIN| -.73014\*\* .34274 -2.13 .0331 -1.40190 -.05837

BSOS:AME| 0.0 .....(Fixed Parameter).....

BSOS:BEN| -2.50618\*\*\* .56512 -4.43 .0000 -3.61380 -1.39856

BSOS:EDU| 0.0 .....(Fixed Parameter).....

BSOS:TIN| 0.0 .....(Fixed Parameter).....

BCOS:AME| -.10971\* .06201 -1.77 .0769 -.23125 .01183

BCOS:BEN| -.18778\*\* .07741 -2.43 .0153 -.33950 -.03607

BCOS:EDU| 0.0 .....(Fixed Parameter).....

BCOS:TIN| 0.0 .....(Fixed Parameter).....

BSQ:AME| 0.0 .....(Fixed Parameter).....

BSQ:BEN| 0.0 .....(Fixed Parameter).....

BSQ:EDU| 0.0 .....(Fixed Parameter).....

BSQ:TIN| 0.0 .....(Fixed Parameter).....

|Distns. of RPs. Std.Devs or limits of triangular

NsBCL| .65175\*\* .29137 2.24 .0253 .08069 1.22282

NsBSS| .29720 .49496 .60 .5482 -.67291 1.26730

NsBSOS| 1.22306\*\*\* .27858 4.39 .0000 .67705 1.76907

TsBCOST| .01813 .28226 .06 .9488 -.53509 .57134

NsBSQ| 1.11187\*\*\* .37783 2.94 .0033 .37134 1.85239

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Note: \*\*\*, \*\*, \* ==> Significance at 1%, 5%, 10% level.

Fixed parameter ... is constrained to equal the value or

had a nonpositive st.error because of an earlier problem.

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Parameter Matrix for Heterogeneity in Means.

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Delta | AMED BENEFIT1 EDU1 TIN1

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BCL| .000000 .000000 .000000 .000000

BSS| -.782134 .000000 .000000 -.730135

BSOS| .000000 -2.50618 .000000 .000000

BCOST| -.109709 -.187783 .000000 .000000

BSQ| .000000 .000000 .000000 .000000

|-> MATRIX ;list;1/81\*1'wtp\_i$

Result| 1 2 3 4

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1| -2.53382 -1.56809 -1.48070 5.45184