**SUDAAN Analysis Examples Replication C11**

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* Sudaan Analysis Examples Replication for ASDA 2nd Edition
* Berglund April 2017
* Chapter 11 ;

libname d "P:\ASDA 2\Data sets\HRS 2012\HRS 2006_2012 Longitudinal File\" ;
options nodate nonumber ls=119 ps=67 ;
ods listing ;
title ;

* note use SAS for all data mangement and Sudaan procedures where possible ;
data c11_hrs ;
 set d.hrs_2006_2012_15jul2016 ;
 if kfinr=1 and kwgtr ne 0 ;
* prepare ln income ;
ln_inc06 = log(H8ITOT + 1);
ln_inc08 = log(H9ITOT + 1);
ln_inc10 = log(H10ITOT + 1);
ln_inc12 = log(H11ITOT + 1);
run ;

*************************************************************************************************;
* Single Wave ;

title "11.3.1 Example: Descriptive Estimation at a Single Wave, Complete Case Analysis Table 11.2" ;
proc sort ;
 by stratum secu ;
run ;
proc descript data=c11_hrs filetype=sas deft1 ;
nest stratum secu ;
weight kwgtr ;
var ln_inc08 ;
setenv decwidth=1 colwidth=12 ;
print mean semean lowmean upmean ;
output / filename=work.outex1131 filetype=sas replace tablecell=all ;
run ;
* post process output data set from Sudaan using SAS ;
data outex1131f ;
 set outex1131 ;
 mean_exp=exp(mean) ;
 lcl_exp=exp(lowmean) ;
 ucl_exp=exp(upmean) ;
run ;
proc print data=outex1131f (obs=1) ;
 var mean_exp lcl_exp ucl_exp ;
run ;

* Single Wave Weight Adjustment ;
title "Single Wave: Weight adjustment approach for 2008 log-income. Compute response indicator for 2008." ;
data c11_hrs_wgt_adj ;
 set c11_hrs ;
 * response in 2008 indicator ;
 if ln_inc08 ne . then resp08=1 ; else resp08=0 ;
 * Modal imputation of missing covariate values. ;
 if selfrhealth_06 = . then selfrhealth_06 = 3 ;
 if marcat_06=. then marcat_06 = 2 ;
 if diabetes_06=. then diabetes_06 = 0 ;
 if arthritis_06=. then arthritis_06 = 1 ;
 if racecat = . then racecat=2 ;
 if edcat = . then edcat=2 ;
run ;

* use SAS to produce data set for final analysis ;
title2 "Logistic Regression with Response in 2008 as Outcome: Weight Adjustment Method for 2008" ;
proc surveylogistic data=c11_hrs_wgt_adj ;
 strata stratum ; cluster secu ; weight kwgtr ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first) / param=ref  ;
 model resp08 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
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```
 output out=outp p=phat ;
run ;
proc rank data=outp groups=10 ties=mean out=outp_deciles ;
 var phat ;
 ranks dec ;
run ;
proc sort ;
 by dec phat ;
run ;
proc sql ;
 create table outp_deciles_1
  as select *, mean(phat) as mean_phat
   from outp_deciles
    group by dec ;
title2 "Mean of Phat by Deciles" ;
proc means n mean data=outp_deciles_1 ;
 class dec ; var mean_phat ;
run ;
* Create adjusted weight ;
data outp_deciles_2 ;
 set outp_deciles_1 ;
 adj_kwgtr = kwgtr*(1/mean_phat) ;
run ;

* Use Sudaan used with final data set with adjusted weight ;
title2 "Mean Income using Adjusted Weight" ;
proc sort ;
 by stratum secu ;
run ;
proc descript data=outp_deciles_2 filetype=sas deft1 ;
nest stratum secu ; weight adj_kwgtr ;
var ln_inc08 ;
setenv decwidth=1 colwidth=12 ;
print mean semean lowmean upmean ;
output / filename=work.outex1131_adjwgt filetype=sas replace tablecell=all ;
run ;
* post process output data set from Sudaan using SAS ;
data outex1131_adjwgt_f ;
 set outex1131_adjwgt ;
 mean_exp=exp(mean) ;
 lcl_exp=exp(lowmean) ;
 ucl_exp=exp(upmean) ;
run ;
proc print data=outex1131_adjwgt_f (obs=1) ;
 var mean_exp lcl_exp ucl_exp ;
run ;


* Single Wave Multiple Imputation ;
title "Single Wave: Multiple Imputation method." ;
* Create deciles of the 2006 sampling weights. ;
proc rank data=c11_hrs groups=10 ties=low out=wt_deciles ;
 var kwgtr ;
 ranks kwgtr_dec ;
run ;
* use modal values for all variables except log income 2008 ;
data wt_deciles_1 ;
 set wt_deciles ;
 * Modal imputation of missing covariate values. ;
 if selfrhealth_06 = . then selfrhealth_06 = 3 ;
 if marcat_06=. then marcat_06 = 2 ;
 if diabetes_06=. then diabetes_06 = 0 ;
 if arthritis_06=. then arthritis_06 = 1 ;
 if racecat = . then racecat=2 ;
 if edcat = . then edcat=2 ;
run ;
title2 "Means of all Variables Included in Imputation" ;
proc means n nmiss mean min max data=wt_deciles_1 ;
```

```
 var ln_inc08 ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat stratum kwgtr_dec
;
run ;

* Sudaan Version 11.x.x offers multiple imputation using the weighted hotdeck method only.
* Note that this is a different method than the FCS/Sequential Regression/Chained Equations method used in Stata,
SAS, and IVEware ;
* Because of this difference in method, we use SAS to perform imputation here but analyze the MI data sets using
Sudaan where possible.

* For examples of how to use Sudaan PROC IMPUTE tools see the Sudaan documentation and examples guide ;
title2 "MI to impute missing data on LN_INC08" ;
proc mi data=wt_deciles_1 nimpute=5 out=outimp seed=41279;
 class selfrhealth_06 marcat_06 racecat edcat stratum kwgtr_dec ;
 var ln_inc08 ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat stratum kwgtr_dec
;
 fcs nbiter=5 reg(ln_inc08=ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat
kwgtr_dec stratum ) ;
 run ;

data outimp1 outimp2 outimp3 outimp4 outimp5 ;
 set outimp ;
 if _imputation_=1 then output outimp1;
 if _imputation_=2 then output outimp2;
 if _imputation_=3 then output outimp3;
 if _imputation_=4 then output outimp4;
 if _imputation_=5 then output outimp5;
run ;
proc sort data=outimp1 ; by stratum secu ; run ;
proc sort data=outimp2 ; by stratum secu ; run ;
proc sort data=outimp3 ; by stratum secu ; run ;
proc sort data=outimp4 ; by stratum secu ; run ;
proc sort data=outimp5 ; by stratum secu ; run ;

* use Sudaan's ability to correctly combine the 5 imputed data sets and calculate design-based MI variances ;
proc descript data=outimp1 filetype=sas mi_count=5 design=wr ;
nest stratum secu ; weight kwgtr ;
var ln_inc08 ;
setenv decwidth=1 colwidth=12 ;
print mean semean lowmean upmean ;
output / filename=work.outex1131_mi filetype=sas replace tablecell=all ;
run ;
* post process output data set from Sudaan using SAS ;
data outex1131_mi_f ;
 set outex1131_mi ;
 mean_exp=exp(mean) ;
 lcl_exp=exp(lowmean) ;
 ucl_exp=exp(upmean) ;
run ;
proc print data=outex1131_mi_f (obs=1) ;
 var mean_exp lcl_exp ucl_exp ;
run ;
* Note: Imputation Using a Selection Model Not Available in SAS/Sudaan procedures" ;


*****************************************************************************************************;
* Change over 2 Waves ;
title "11.3.2 Example: Change across Two Waves. 1. Complete Case Analysis." ;
* prepare data set from wide file ;
data c11_hrs_2waves ;
 set d.hrs_2006_2012_15jul2016 ;
  if kfinr=1 and kwgtr ne 0 ;
  * prepare ln income ;
  ln_inc06 = log(H8ITOT + 1);
  ln_inc08 = log(H9ITOT + 1);
  ln_inc10 = log(H10ITOT + 1);
  ln_inc12 = log(H11ITOT + 1);
  incdiff_06_10=h10itot-h8itot ;
  * response in 2010 for weight adjustment ;
```

```
  resp10=0 ;
  if ln_inc10 ne . then resp10=1 ;
  * Modal imputation of missing covariate values. ;
 if selfrhealth_06 = . then selfrhealth_06 = 3 ;
 if marcat_06=. then marcat_06 = 2 ;
 if diabetes_06=. then diabetes_06 = 0 ;
 if arthritis_06=. then arthritis_06 = 1 ;
 if racecat = . then racecat=2 ;
 if edcat = . then edcat=2 ;
run ;
proc sort ;
 by stratum secu ;
run ;

proc descript data=c11_hrs_2waves deft1 ;
nest stratum secu ;
weight kwgtr ;
var incdiff_06_10 ;
setenv decwidth=1 colwidth=12 ;
print mean semean lowmean upmean ;
output / filename=work.outex1132 filetype=sas replace tablecell=all ;
run ;


* 2. Weight Adjustment. Use SAS for data management and then Sudaan for final analysis ;
* prepare table of response in 2010 ;
title "Response in 2010" ;
proc freq data=c11_hrs_2waves ;
 tables resp10 / missing ;
run ;
title "Logistic Regression with Response in 2010 as Outcome: Weight Adjustment Method for 2010" ;
proc surveylogistic data=c11_hrs_2waves ;
 strata stratum ; cluster secu ; weight kwgtr ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first) / param=ref  ;
 model resp10 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=outp1 p=phat1 ;
run ;
* ranks for phat using ties=low option ;
proc rank data=outp1 groups=10 ties=low out=outp_deciles ;
 var phat1 ;
 ranks dec ;
run ;
proc sort ;
 by dec phat1;
run ;
* mean of phat by deciles ;
proc sql ;
 create table outp_deciles_1
  as select *, mean(phat1) as mean_phat
   from outp_deciles
    group by dec ;
* create an adjusted weight ;
data outp_deciles_2 ;
 set outp_deciles_1 ;
 adj_kwgtr = kwgtr*(1/mean_phat) ;
run ;
proc sort ;
 by stratum secu ;
run ;
title "Mean Income Difference using Adjusted Weight" ;
* Note slight differences from Stata output due to differences in how PROC RANK develops deciles ;
proc descript data=outp_deciles_2 deft1 ;
nest stratum secu ; weight adj_kwgtr ;
var incdiff_06_10 ;
setenv decwidth=3 colwidth=12 ;
print mean semean lowmean upmean ;
output / filename=work.outex1132 filetype=sas replace tablecell=all ;
run ;
```

```
* 3. Multiple Imputation.
* Multiple imputation of 2010 log-income.
* Create deciles of the 2006 sampling weights. ;
proc rank data=c11_hrs groups=10 ties=low out=wt_deciles ;
 var kwgtr ;
 ranks kwgtr_dec ;
run ;
* use modal values for all variables except log income 2010 ;
data wt_deciles_1 ;
 set wt_deciles ;
 * Modal imputation of missing covariate values. ;
 if selfrhealth_06 = . then selfrhealth_06 = 3 ;
 if marcat_06=. then marcat_06 = 2 ;
 if diabetes_06=. then diabetes_06 = 0 ;
 if arthritis_06=. then arthritis_06 = 1 ;
 if racecat = . then racecat=2 ;
 if edcat = . then edcat=2 ;
 incdiff_06_10=h10itot-h8itot ;
run ;
title "3. Multiple Imputation, MI of 2010 log-income" ;
proc means n nmiss mean min max data=wt_deciles_1 nolabels ;
 var ln_inc10 ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat stratum kwgtr_dec
incdiff_06_10 ;
run ;
* use PROC MI for imputation as Sudaan does not offer sequential regression imputation method for multiple imputation
v. single imputation ;
proc mi data=wt_deciles_1 nimpute=5 out=outimpa seed=41279;
 class selfrhealth_06 marcat_06 racecat edcat stratum kwgtr_dec ;
 var ln_inc10 ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat stratum kwgtr_dec
;
 fcs nbiter=5 reg (ln_inc10=ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat
kwgtr_dec stratum) ;
 run ;
* Obtain summary statistics for income diff 06_10 and log income 2010, from non imputed data set ;
proc means data=wt_deciles_1 ;
 var incdiff_06_10 ln_inc10 ;
run ;

* Compute bounded change scores in each imputed data set.;
data outimpa ;
 set outimpa ;
 * set upper and lower bounds for log income 2010 and difference of 2010 and 2006 ;
 if ln_inc10 > 14.92 then ln_inc10=14.92 ;
 new_chg0610=exp(ln_inc10) - exp(ln_inc06) ;
 if new_chg0610 < -12300000 then new_chg0610 = -12300000 ;
 if new_chg0610 > 2062968 then new_chg0610 = 2062968 ;
run ;
data outimpa1 outimpa2 outimpa3 outimpa4 outimpa5 ;
 set outimpa ;
 if _imputation_=1 then output outimpa1;
 if _imputation_=2 then output outimpa2;
 if _imputation_=3 then output outimpa3;
 if _imputation_=4 then output outimpa4;
 if _imputation_=5 then output outimpa5;
run ;
proc sort data=outimpa1 ; by stratum secu ; run ;
proc sort data=outimpa2 ; by stratum secu ; run ;
proc sort data=outimpa3 ; by stratum secu ; run ;
proc sort data=outimpa4 ; by stratum secu ; run ;
proc sort data=outimpa5 ; by stratum secu ; run ;


* use PROC DESCRIPT with output data from SAS PROC MI ;
* Note Sudaan's ability to correctly combine the 5 imputed data sets and calculate design-based MI variances, obtain
combined statistics for income change 2006 to 2010 ;
proc descript data=outimpa1 filetype=sas mi_count=5 design=wr ;
nest stratum secu ; weight kwgtr ;
var new_chg0610 ;
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setenv decwidth=3 colwidth=12 ;
print mean semean lowmean upmean ;
output / filename=work.outex1132_mi filetype=sas replace tablecell=all ;
run ;



* 4. Calibration. ;
* Note: Sudaan weight/calibration commands WTADJUST/WTADJX Demonstrate only a single wave calibration/adjustment
process therefore we use the SAS code for data management/preparation and then Sudaan for final step of analysis
;
data cal ;
 set d.hrs_2006_2012_15jul2016 ;
 if kfinr=1 and kwgtr ne 0 ;
 * Modal imputation of missing covariate values. Note that gender has no missing data. ;
 if racecat =. then racecat=2 ;
 if edcat=. then edcat=2 ;
run ;
title "4. Calibration: Cross-Class distributions " ;
proc freq data=cal ;
 tables racecat*edcat*gender /list ;
run ;
* Compute sums of 2006 weights in cross-classes
* defined by sex, race, and education. ;
title2 "Sum of KWGTR by cross-classes" ;
proc means sum nmiss mean data=cal ;
 class racecat edcat gender ;
 var kwgtr ;
 output out=cal_pop_sizes (where=(_type_=7)) sum=popsize ;
run ;
* 32 cross classes with sums of weight kwgtr ;
proc print data=cal_pop_sizes ;
run ;
title2 "Repeat process for cases with complete data." ;
data complete ;
 set d.hrs_2006_2012_15jul2016 ;
 if kfinr=1 and kwgtr ne 0 ;
 * Modal imputation of missing covariate values.;
 if racecat =. then racecat=2 ;
 if edcat=. then edcat=2 ;
 ln_inc10=log(h10itot + 1) ;
 if ln_inc10 ne . then resp10=1 ;
       else if ln_inc10 eq . then resp10=0 ;
 if resp10=1 ;
run ;
* Compute sums of 2006 weights among those that responded in 2010 and in cross-classes defined by sex, race, and
education. ;
proc means sum nmiss mean data=complete ;
 class racecat edcat gender ;
 var kwgtr ;
 output out=cal_resp_sizes (where=(_type_=7)) sum=sumrespwgts ;
run ;
* 32 cross classes with sums of weight kwgtr ;
proc print data=cal_resp_sizes ;
run ;
* Merge the two data sets of estimated population sizes.;
proc sort data=cal_pop_sizes ; by racecat edcat gender ; run ;
proc sort data=cal_resp_sizes ; by racecat edcat gender ; run ;
data cal_resp_pop_sizes ;
 merge cal_pop_sizes cal_resp_sizes ;
  by racecat edcat gender ;
  * create cal_adj ;
  cal_adj=popsize/sumrespwgts ;
run ;
data cal_1  ;
 set d.hrs_2006_2012_15jul2016 ;
 if kfinr=1 and kwgtr ne 0 ;
 * Modal imputation of missing covariate values.;
 if racecat =. then racecat=2 ;
```

```
 if edcat=. then edcat=2 ;
 ln_inc06=log(h8itot + 1) ;
 ln_inc10=log(h10itot + 1) ;
run ;
proc sort ;
 by racecat edcat gender ;
run ;
data cal_cal_resp_pop_sizes ;
 merge cal_1 (in=cal) cal_resp_pop_sizes ;
 by racecat edcat gender ;
 if cal=1 ; * maintain the larger n of 11,789 ;
 * response indicator for 2010 ;
 if ln_inc10 ne . then resp10=1 ; else if ln_inc10=. then resp10=0 ;
 * calibrated weights for those with complete data ;
 if resp10=1 then kwgtr_cal= kwgtr*cal_adj ;
 incdiff_06_10=h10itot - h8itot ;
run ;
* Verify that sums of calibrated weights for cases with complete data are equal to sums of base weights for full
sample. ;
title2 "Sums of Kwgtr by race, education, gender" ;
proc means sum ;
  class racecat edcat gender ;
  var kwgtr ;
run ;
title2 "Kwgtr_cal should match Kwgtr among respondents" ;
proc means sum ;
 class racecat edcat gender ;
 var kwgtr_cal ;
 where resp10=1 ;
run ;
* sort data prior to use of PROC DESCRIPT ;
proc sort ;
 by stratum secu ;
run ;
title2 "Estimate mean change using complete cases. Table 11.3"  ;
proc descript data=cal_cal_resp_pop_sizes  filetype=sas design=wr ;
nest stratum secu ; weight kwgtr_cal ;
var incdiff_06_10 ;
setenv decwidth=3 colwidth=12 ;
print mean semean lowmean upmean ;
run ;


*************************************************************************************************;
* Analysis of 3+ Waves ;
* 1. Weighted Multilevel Modeling: weighted multilevel modeling including weights for each level of clustering
not available in Sudaan ;
* 2. Veiga et al. (2014) approach. is not available in Sudaan ;


* 3. Weighted GEE Analysis. ;
* Use SAS for data setup with Sudaan REGRESS command for repeated measures over time ;

libname d "P:\ASDA 2\Data sets\HRS 2012\HRS 2006_2012 Longitudinal File\" ;
title "11.3.4 Example: Weighted GEE Analysis" ;
data hrs_2006_2012 ;
 set d.hrs_2006_2012_15jul2016 ;
 if kfinr=1 and kwgtr ne 0 ;
 * Modal imputation of missing covariate values. ;
 if selfrhealth_06 = . then selfrhealth_06 = 3 ;
 if marcat_06=. then marcat_06 = 2 ;
 if diabetes_06=. then diabetes_06 = 0 ;
 if arthritis_06=. then arthritis_06 = 1 ;
 if racecat = . then racecat=2 ;
 if edcat = . then edcat=2 ;
 * prepare ln income ;
 ln_inc06 = log(H8ITOT + 1);
 ln_inc08 = log(H9ITOT + 1);
 ln_inc10 = log(H10ITOT + 1);
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```
 ln_inc12 = log(H11ITOT + 1);
  * Compute response indicator for 2008.;
 if ln_inc08 ne . then resp08 = 1 ; else resp08 = 0 ;
 * Compute response indicator for 2010.;
 if ln_inc10 ne . then resp10=1 ; else resp10=0 ;
 * Compute response indicator for 2012.;
 if ln_inc12 ne . then resp12=1 ; else resp12=0 ;
run ;
title "11.3.4 Weighted GEE: Check Response in 2008, 2010, 2012" ;
proc freq ;
 tables resp08 resp10 resp12 ;
run ;
title " Response propensity model (2008)." ;
proc surveylogistic data=hrs_2006_2012 ;
 strata stratum ; cluster secu ; weight kwgtr ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first)/ param = ref ;
 model resp08 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=p1 p=phat08 ;
run ;
proc means n nmiss mean stderr clm ;
 var phat08 ;
run ;

title " Response propensity model (2010), respondents in 2008." ;
proc surveylogistic data=hrs_2006_2012 ;
 strata stratum ; cluster secu ; weight kwgtr ;
 domain resp08 ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first)/ param = ref ;
 model resp10 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=p2 (where=(domain='resp08=1') keep=hhid pn phat10_11 domain ) p=phat10_11 ;
run ;
proc means n nmiss mean stderr clm ;
 var phat10_11 ;
run ;
title " Response propensity model (2010), non respondents in 2008." ;
proc surveylogistic data=hrs_2006_2012 ;
 strata stratum ; cluster secu ; weight kwgtr ;
 domain resp08 ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first)/ param = ref ;
 model resp10 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=p3 (where=(domain='resp08=0') keep=hhid pn phat10_10 domain ) p=phat10_10 ;
run ;
proc means data=p3 n nmiss mean stderr clm ;
 var phat10_10 ;
run ;
* Response propensity model (2012), 111 pattern.;
title " Response propensity model (2012), 111 Pattern (06,08,10) " ;
proc surveylogistic data=hrs_2006_2012 ;
 strata stratum ; cluster secu ; weight kwgtr ;
 domain resp08*resp10 ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first)/ param = ref ;
 model resp12 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=p4 (where=(domain='resp08=1 resp10=1') keep=hhid pn phat12_111 domain) p=phat12_111 ;
run ;
proc means n nmiss mean stderr clm ;
 var phat12_111 ;
run ;
* Response propensity model (2012), 110 pattern.;
title " Response propensity model (2012), 110 Pattern (06,08,no 10) " ;
proc surveylogistic data=hrs_2006_2012 ;
 strata stratum ; cluster secu ; weight kwgtr ;
 domain resp08*resp10 ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first)/ param = ref ;
 model resp12 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=p5 (where=(domain='resp08=1 resp10=0') keep=hhid pn phat12_110 domain) p=phat12_110 ;
run ;
proc means n nmiss mean ;
  var phat12_110 ;
run ;
```

```
* Response propensity model (2012), 101 pattern.;
title " Response propensity model (2012), 101 Pattern (06,no 08,10) " ;
proc surveylogistic data=hrs_2006_2012 ;
 strata stratum ; cluster secu ; weight kwgtr ;
 domain resp08*resp10 ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first)/ param = ref ;
 model resp12 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=p6 (where=(domain='resp08=0 resp10=1') keep=hhid pn phat12_101 domain) p=phat12_101 ;
run ;
proc means n nmiss mean stderr ;
  var phat12_101 ;
run ;
* Response propensity model (2012), 100 pattern.;
title " Response propensity model (2012), 100 Pattern (06,no 08,no 10) " ;
proc surveylogistic data=hrs_2006_2012 ;
 strata stratum ; cluster secu ; weight kwgtr ;
 domain resp08*resp10 ;
 class selfrhealth_06 (ref=first) marcat_06 (ref=first) racecat (ref=first) edcat (ref=first)/ param = ref ;
 model resp12 (event='1') = ln_inc06 selfrhealth_06 age_06 marcat_06 diabetes_06 arthritis_06 racecat edcat ;
 output out=p7 (where=(domain='resp08=0 resp10=0') keep=hhid pn phat12_100 domain) p=phat12_100 ;
run ;
proc means n nmiss mean stderr clm  ;
  var phat12_100 ;
run ;

*merge all data sets together using hhid and pn ;
data all_cumprobs ;
 merge p1 p2 p3 p4 p5 p6 p7 ;
 by hhid pn ;
 drop domain ;
* develop cumulative probabilities ;
cumprob1=1 ;
 if resp08=1 & resp10=1 & resp12=1 then cumprob4 = phat08 * phat10_11 *  phat12_111 ;
 if resp08=1 & resp10=1 & resp12=0 then cumprob4 = phat08 * phat10_11 * (1-phat12_111) ;
 if resp08=1 & resp10=0 & resp12=1 then cumprob4 = phat08 *(1-phat10_11) * phat12_110 ;
 if resp08=1 & resp10=0 & resp12=0 then cumprob4 = phat08 *(1-phat10_11)*(1-phat12_110) ;
 if resp08= 0 & resp10=1 & resp12=1 then cumprob4 =(1-phat08)*phat10_10 * phat12_101 ;
 if resp08= 0 & resp10=1 & resp12=0 then cumprob4 =(1-phat08)*phat10_10* (1-phat12_101) ;
 if resp08= 0 & resp10=0 & resp12=1 then cumprob4 =(1-phat08)*(1-phat10_10)* phat12_100 ;
 if resp08= 0 & resp10=0 & resp12=0 then cumprob4= (1-phat08)*(1-phat10_10)*(1-phat12_100) ;
 cumprob_case= cumprob4 ;
 ln_inc1=log(h8itot + 1) ;
 ln_inc2=log(h9itot + 1) ;
 ln_inc3=log(h10itot + 1) ;
 ln_inc4=log(h11itot + 1) ;
run ;

title "Mean for CUMCPROB_CASE (Cumulative Probability Weight) " ;
proc means n nmiss mean std min max  data=all_cumprobs ;
 var cumprob_case ;
run ;
* reshape from wide to long data set ;
data hrs_long ;
 set all_cumprobs ;
 array inc [*] ln_inc1-ln_inc4 ;
 do i=1 to 4 ;
       ln_inc = inc[i] ;
    year=i ;
       basewgt=kwgtr ;
 output ;
 end ;
keep hhid pn gender marcat_06 diabetes_06 arthritis_06 racecat edcat secu stratum cumprob_case ln_inc basewgt year
;
run ;


* prepare long data set for GEE weighted model ;
data hrs_long_1 ;
 set hrs_long ;
```

```
 casewt = basewgt * (1 / cumprob_case) ;
* Compute measure of years since 2006, and squared version. ;
if year=1 then yrssince06 = 0 ;
if year=2 then yrssince06 = 2 ;
if year=3 then yrssince06 = 4 ;
if year=4 then yrssince06 = 6 ;
yrs06sq = yrssince06*yrssince06 ;
newid=trim(hhid)||trim(pn) ;
newid_num=newid * 1 ;
run ;
proc sort data=hrs_long_1 ;
 by newid_num ;
run ;
proc contents ;
run ;
```

```
* use of PROC REGRESS with R=exchangeable for linear regression with GEE approach and robust standard errors ;
title "GEE Model with Repeated Measures Per Individual (Financial Respondent), 2006-2012" ;
proc regress data=hrs_long_1 R=exchangeable ;
 nest  _one_ newid_num ; weight casewt ;
 reflevel gender = 1 stratum =1 ; class gender stratum ;
 model ln_inc = yrssince06 gender yrs06sq yrssince06*gender yrs06sq*gender stratum ;
 test waldchi ;
 setenv decwidth=4;
run ;
```

**Output SUDAAN Analysis Examples Replication C11**

11.3.1 Example: Descriptive Estimation at a Single Wave, Complete Case Analysis Table 11.2

```
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DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR)
Design
    Sample Weight: KWGTR
    Stratification Variables(s): STRATUM
    Primary Sampling Unit: SECU


Number of observations read    :  11789    Weighted count : 52555987
Denominator degrees of freedom :     56


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Variance Estimation Method: Taylor Series (WR)
by: Variable, SUDAAN Reserved Variable One.

-----------------------------------------------------------------------
|                 |                 | SUDAAN Reserved Variable    |
| Variable        |                 | One                         |
|                 |                 |-----------------------------|
|                 |                 | Total        | 1            |
-----------------------------------------------------------------------
|                 |                 |              |              |
| LN_INC08        | Mean            |         10.4 |         10.4 |
|                 | SE Mean         |          0.0 |          0.0 |
|                 | Lower 95% Limit |              |              |
|                 |  Mean           |         10.4 |         10.4 |
|                 | Upper 95% Limit |              |              |
|                 |  Mean           |         10.5 |         10.5 |
-----------------------------------------------------------------------
```

11.3.1 Example: Descriptive Estimation at a Single Wave, Complete Case Analysis Table 11.2

| Obs | mean_exp | lcl_exp | ucl_exp |
|---|---|---|---|
| 1 | 34223.97 | 32467.83 | 36075.10 |

Single Wave: Weight adjustment approach for 2008 log-income. Compute response indicator for 2008.
Logistic Regression with Response in 2008 as Outcome: Weight Adjustment Method for 2008

The SURVEYLOGISTIC Procedure

Model Information

| | | |
|---|---|---|
| Data Set | WORK.C11_HRS_WGT_ADJ | |
| Response Variable | resp08 | |
| Number of Response Levels | 2 | |
| Stratum Variable | STRATUM | STRATUM ID |
| Number of Strata | 56 | |
| Cluster Variable | SECU | SAMPLING ERROR COMPUTATION UNIT |
| Number of Clusters | 112 | |
| Weight Variable | KWGTR | 2006 WEIGHT: RESPONDENT LEVEL |
| Model | Binary Logit | |
| Optimization Technique | Fisher's Scoring | |
| Variance Adjustment | Degrees of Freedom (DF) | |

Variance Estimation

| | |
|---|---|
| Method | Taylor Series |
| Variance Adjustment | Degrees of Freedom (DF) |

| | |
|---|---|
| Number of Observations Read | 11789 |
| Number of Observations Used | 11789 |
| Sum of Weights Read | 52555987 |
| Sum of Weights Used | 52555987 |

Response Profile

| Ordered Value | resp08 | Total Frequency | Total Weight |
|---|---|---|---|
| 1 | 0 | 1215 | 4942420 |
| 2 | 1 | 10574 | 47613567 |

Probability modeled is resp08=1.

Class Level Information

| Class | Value | Design Variables | | | |
|---|---|---|---|---|---|
| selfrhealth_06 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 1 | 0 | 0 | 0 |
| | 3 | 0 | 1 | 0 | 0 |
| | 4 | 0 | 0 | 1 | 0 |
| | 5 | 0 | 0 | 0 | 1 |
| marcat_06 | 1 | 0 | 0 | | |
| | 2 | 1 | 0 | | |
| | 3 | 0 | 1 | | |
| racecat | 1 | 0 | 0 | 0 | |
| | 2 | 1 | 0 | 0 | |
| | 3 | 0 | 1 | 0 | |
| | 4 | 0 | 0 | 1 | |
| edcat | 1 | 0 | 0 | 0 | |
| | 2 | 1 | 0 | 0 | |
| | 3 | 0 | 1 | 0 | |
| | 4 | 0 | 0 | 1 | |

Single Wave: Weight adjustment approach for 2008 log-income. Compute response indicator for 2008.
Logistic Regression with Response in 2008 as Outcome: Weight Adjustment Method for 2008

The SURVEYLOGISTIC Procedure

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

| Criterion | Intercept Only | Intercept and Covariates |
|---|---|---|
| AIC | 32772754 | 30734556 |
| SC | 32772770 | 30734825 |
| -2 Log L | 32772752 | 30734522 |

Testing Global Null Hypothesis: BETA=0

| Test | F Value | Num DF | Den DF | Pr > F |
|---|---|---|---|---|
| Likelihood Ratio | 129728 | 11.6596 | 652.94 | <.0001 |
| Score | 19.99 | 16 | 41 | <.0001 |
| Wald | 22.66 | 16 | 41 | <.0001 |

NOTE: Second-order Rao-Scott design correction
0.3723 applied to the Likelihood Ratio test.

Type 3 Analysis of Effects

| Effect | F Value | Num DF | Den DF | Pr > F |
|---|---|---|---|---|
| ln_inc06 | 0.04 | 1 | 56 | 0.8405 |
| selfrhealth_06 | 43.04 | 4 | 53 | <.0001 |
| age_06 | 102.51 | 1 | 56 | <.0001 |
| marcat_06 | 2.81 | 2 | 55 | 0.0691 |
| diabetes_06 | 7.90 | 1 | 56 | 0.0068 |
| arthritis_06 | 28.03 | 1 | 56 | <.0001 |
| racecat | 2.17 | 3 | 54 | 0.1025 |
| edcat | 0.44 | 3 | 54 | 0.7245 |

Analysis of Maximum Likelihood Estimates

| Parameter | | Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | | 5.6307 | 0.5440 | 10.35 | <.0001 |
| ln_inc06 | | 0.00727 | 0.0359 | 0.20 | 0.8405 |
| selfrhealth_06 | 2 | -0.1526 | 0.1534 | -0.99 | 0.3242 |
| selfrhealth_06 | 3 | -0.3367 | 0.1865 | -1.81 | 0.0764 |
| selfrhealth_06 | 4 | -0.7260 | 0.1681 | -4.32 | <.0001 |
| selfrhealth_06 | 5 | -1.4960 | 0.1871 | -8.00 | <.0001 |
| age_06 | | -0.0439 | 0.00434 | -10.12 | <.0001 |
| marcat_06 | 2 | 0.00848 | 0.0892 | 0.10 | 0.9246 |
| marcat_06 | 3 | -0.4002 | 0.1774 | -2.26 | 0.0280 |
| diabetes_06 | | -0.2035 | 0.0724 | -2.81 | 0.0068 |
| arthritis_06 | | 0.3311 | 0.0625 | 5.29 | <.0001 |
| racecat | 2 | 0.0251 | 0.1419 | 0.18 | 0.8601 |
| racecat | 3 | -0.1931 | 0.1709 | -1.13 | 0.2634 |

NOTE: The degrees of freedom for the t tests is 56.

Single Wave: Weight adjustment approach for 2008 log-income. Compute response indicator for 2008.
Logistic Regression with Response in 2008 as Outcome: Weight Adjustment Method for 2008

The SURVEYLOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

| Parameter | | Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|---|
| racecat | 4 | -0.4276 | 0.2735 | -1.56 | 0.1236 |
| edcat | 2 | -0.0468 | 0.1016 | -0.46 | 0.6471 |
| edcat | 3 | -0.1353 | 0.1206 | -1.12 | 0.2667 |
| edcat | 4 | -0.0177 | 0.1139 | -0.16 | 0.8773 |

NOTE: The degrees of freedom for the t tests is 56.

Odds Ratio Estimates

| Effect | | Point Estimate | 95% Confidence Limits | |
|---|---|---|---|---|
| ln_inc06 | | 1.007 | 0.937 | 1.082 |
| selfrhealth_06 | 2 vs 1 | 0.858 | 0.631 | 1.167 |
| selfrhealth_06 | 3 vs 1 | 0.714 | 0.492 | 1.038 |
| selfrhealth_06 | 4 vs 1 | 0.484 | 0.346 | 0.678 |
| selfrhealth_06 | 5 vs 1 | 0.224 | 0.154 | 0.326 |
| age_06 | | 0.957 | 0.949 | 0.965 |
| marcat_06 | 2 vs 1 | 1.009 | 0.844 | 1.206 |
| marcat_06 | 3 vs 1 | 0.670 | 0.470 | 0.956 |
| diabetes_06 | | 0.816 | 0.706 | 0.943 |
| arthritis_06 | | 1.393 | 1.229 | 1.578 |
| racecat | 2 vs 1 | 1.025 | 0.772 | 1.362 |
| racecat | 3 vs 1 | 0.824 | 0.585 | 1.161 |
| racecat | 4 vs 1 | 0.652 | 0.377 | 1.128 |
| edcat | 2 vs 1 | 0.954 | 0.779 | 1.170 |
| edcat | 3 vs 1 | 0.873 | 0.686 | 1.112 |
| edcat | 4 vs 1 | 0.982 | 0.782 | 1.234 |

NOTE: The degrees of freedom in computing
the confidence limits is 56.

Association of Predicted Probabilities and Observed Responses

| | | | |
|---|---|---|---|
| Percent Concordant | 67.9 | Somers' D | 0.366 |
| Percent Discordant | 31.2 | Gamma | 0.370 |
| Percent Tied | 0.9 | Tau-a | 0.068 |
| Pairs | 12847410 | c | 0.683 |

Single Wave: Weight adjustment approach for 2008 log-income. Compute response indicator for 2008.
Mean of Phat by Deciles

The MEANS Procedure

Analysis Variable : mean_phat

| Rank for Variable phat | N Obs | N | Mean |
|---|---|---|---|
| 0 | 1178 | 1178 | 0.7373740 |
| 1 | 1179 | 1179 | 0.8331323 |
| 2 | 1179 | 1179 | 0.8682070 |
| 3 | 1179 | 1179 | 0.8903160 |
| 4 | 1179 | 1179 | 0.9068177 |
| 5 | 1179 | 1179 | 0.9202366 |
| 6 | 1179 | 1179 | 0.9308581 |
| 7 | 1179 | 1179 | 0.9405440 |
| 8 | 1179 | 1179 | 0.9502527 |
| 9 | 1179 | 1179 | 0.9623867 |

Single Wave: Weight adjustment approach for 2008 log-income. Compute response indicator for 2008.
Mean Income using Adjusted Weight

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DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR)
Design
Sample Weight: ADJ_KWGTR
Stratification Variables(s): STRATUM
Primary Sampling Unit: SECU

Number of observations read : 11789 Weighted count : 58317821
Denominator degrees of freedom : 56



Variance Estimation Method: Taylor Series (WR)
by: Variable, SUDAAN Reserved Variable One.

| Variable | | SUDAAN Reserved Variable One | |
|---|---|---|---|
| | | Total | 1 |
| LN_INC08 | Mean | 10.4 | 10.4 |
| | SE Mean | 0.0 | 0.0 |
| | Lower 95% Limit Mean | 10.4 | 10.4 |
| | Upper 95% Limit Mean | 10.5 | 10.5 |

Single Wave: Weight adjustment approach for 2008 log-income. Compute response indicator for 2008.
Mean Income using Adjusted Weight

| Obs | mean_exp | lcl_exp | ucl_exp |
|---|---|---|---|
| 1 | 33309.01 | 31579.84 | 35132.85 |

Single Wave: Multiple Imputation method.
Means of all Variables Included in Imputation

The MEANS Procedure

| Variable | Label | N | N Miss | Mean | Minimum |
|---|---|---|---|---|---|
| ln_inc08 | | 10574 | 1215 | 10.3268766 | 0 |
| ln_inc06 | | 11789 | 0 | 10.2909710 | 0 |
| selfrhealth_06 | 1=Excellent 2=Very Good 3=Good 4=Fair 5=Poor | 11789 | 0 | 2.9179744 | 1.0000000 |
| age_06 | Age in 2006 | 11789 | 0 | 69.5194673 | 52.0000000 |
| marcat_06 | Marital Status 1=Married 2=Previously Married 3=Never Married | 11789 | 0 | 1.5744338 | 1.0000000 |
| diabetes_06 | 1=Yes Diabetes 0=No Diabetes | 11789 | 0 | 0.2129103 | 0 |
| arthritis_06 | Arthritis 1=Yes 0=No | 11789 | 0 | 0.6252439 | 0 |
| racecat | Race 1=Hispanic 2=NH White 3=NH Black 4=NH Other | 11789 | 0 | 2.1140046 | 1.0000000 |
| edcat | Education 1=0-11 Yrs 2=12 Yrs 3=13-15 Yrs 4=16+ Yrs | 11789 | 0 | 2.3958775 | 1.0000000 |
| STRATUM | STRATUM ID | 11789 | 0 | 30.6344898 | 1.0000000 |
| kwgtr_dec | Rank for Variable KWGTR | 11789 | 0 | 4.4854525 | 0 |

| Variable | Label | Maximum |
|---|---|---|
| ln_inc08 | | 17.9100947 |
| ln_inc06 | | 17.0486936 |
| selfrhealth_06 | 1=Excellent 2=Very Good 3=Good 4=Fair 5=Poor | 5.0000000 |
| age_06 | Age in 2006 | 104.0000000 |
| marcat_06 | Marital Status 1=Married 2=Previously Married 3=Never Married | 3.0000000 |
| diabetes_06 | 1=Yes Diabetes 0=No Diabetes | 1.0000000 |
| arthritis_06 | Arthritis 1=Yes 0=No | 1.0000000 |
| racecat | Race 1=Hispanic 2=NH White 3=NH Black 4=NH Other | 4.0000000 |
| edcat | Education 1=0-11 Yrs 2=12 Yrs 3=13-15 Yrs 4=16+ Yrs | 4.0000000 |
| STRATUM | STRATUM ID | 56.0000000 |
| kwgtr_dec | Rank for Variable KWGTR | 9.0000000 |

Single Wave: Multiple Imputation method.
MI to impute missing data on LN_INC08

The MI Procedure

Model Information

| | |
|---|---|
| Data Set | WORK.WT_DECILES_1 |
| Method | FCS |
| Number of Imputations | 5 |
| Number of Burn-in Iterations | 5 |
| Seed for random number generator | 41279 |

FCS Model Specification

| Method | Imputed Variables |
|---|---|
| Regression | ln_inc08 ln_inc06 age_06 diabetes_06 arthritis_06 |
| Discriminant Function | selfrhealth_06 marcat_06 racecat edcat STRATUM kwgtr_dec |

Missing Data Patterns

| Group | ln_inc08 | ln_inc06 | selfrhealth_06 | age_06 | marcat_06 | diabetes_06 | arthritis_06 | racecat | edcat | STRATUM | kwgtr_dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | X | X | X | X | X | X | X | X | X | X | X |
| 2 | . | X | X | X | X | X | X | X | X | X | X |

Missing Data Patterns

| | | | Group Means | | | | |
|---|---|---|---|---|---|---|---|
| Group | Freq | Percent | ln_inc08 | ln_inc06 | age_06 | diabetes_06 | arthritis_06 |
| 1 | 10574 | 89.69 | 10.326877 | 10.320609 | 69.000473 | 0.206733 | 0.623038 |
| 2 | 1215 | 10.31 | . | 10.033033 | 74.036214 | 0.266667 | 0.644444 |

Variance Information (5 Imputations)

| | Variance | | | | Relative Increase | Fraction Missing | Relative |
|---|---|---|---|---|---|---|---|
| Variable | Between | Within | Total | DF | in Variance | Information | Efficiency |
| ln_inc08 | 0.000013853 | 0.000158 | 0.000175 | 424.79 | 0.105078 | 0.099150 | 0.980556 |

Parameter Estimates (5 Imputations)

| Variable | Mean | Std Error | 95% Confidence Limits | | DF | Minimum | Maximum | Mu0 |
|---|---|---|---|---|---|---|---|---|
| ln_inc08 | 10.297283 | 0.013222 | 10.27129 | 10.32327 | 424.79 | 10.293305 | 10.303288 | 0 |

Parameter Estimates (5 Imputations)

| Variable | t for H0: Mean=Mu0 | Pr > \|t\| |
|---|---|---|
| ln_inc08 | 778.78 | <.0001 |

Single Wave: Multiple Imputation method.
MI to impute missing data on LN_INC08

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DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR) Design
Sample Weight: KWGTR
Stratification Variables(s): STRATUM
Primary Sampling Unit: SECU

Processing data for set 1 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 2 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 3 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 4 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 5 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Variance Estimation Method: Taylor Series (WR) Using Multiply Imputed Data
Results for Summary Over All Imputations
by: Variable, SUDAAN Reserved Variable One.

| Variable | | SUDAAN Reserved Variable One | |
|---|---|---|---|
| | | Total | 1 |
| LN_INC08 | Mean | 10.4 | 10.4 |
| | SE Mean | 0.0 | 0.0 |
| | Lower 95% Limit Mean | 10.4 | 10.4 |
| | Upper 95% Limit Mean | 10.5 | 10.5 |

Single Wave: Multiple Imputation method.
MI to impute missing data on LN_INC08

| Obs | mean_exp | lcl_exp | ucl_exp |
|---|---|---|---|
| 1 | 33333.85 | 31656.71 | 35099.84 |

*** Note: Imputation Using a Selection Model Not Available in SAS/Sudaan procedures" ;**

11.3.2 Example: Change across Two Waves.

1. Complete Case Analysis.

```
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DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR)
Design
    Sample Weight: KWGTR
    Stratification Variables(s): STRATUM
    Primary Sampling Unit: SECU


Number of observations read    :  11789    Weighted count : 52555987
Denominator degrees of freedom :     56


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Variance Estimation Method: Taylor Series (WR)
by: Variable, SUDAAN Reserved Variable One.
```

| Variable | | SUDAAN Reserved Variable One | |
|---|---|---|---|
| | | Total | 1 |
| INCDIFF_06_10 | Mean | -6551.4 | -6551.4 |
| | SE Mean | 1866.1 | 1866.1 |
| | Lower 95% Limit Mean | -10289.7 | -10289.7 |
| | Upper 95% Limit Mean | -2813.1 | -2813.1 |

2. Logistic Regression with Response in 2010 as Outcome: Weight Adjustment Method for 2010

The SURVEYLOGISTIC Procedure

Model Information

| | | |
|---|---|---|
| Data Set | WORK.C11_HRS_2WAVES | |
| Response Variable | resp10 | |
| Number of Response Levels | 2 | |
| Stratum Variable | STRATUM | STRATUM ID |
| Number of Strata | 56 | |
| Cluster Variable | SECU | SAMPLING ERROR COMPUTATION UNIT |
| Number of Clusters | 112 | |
| Weight Variable | KWGTR | 2006 WEIGHT: RESPONDENT LEVEL |
| Model | Binary Logit | |
| Optimization Technique | Fisher's Scoring | |
| Variance Adjustment | Degrees of Freedom (DF) | |

Variance Estimation

| | |
|---|---|
| Method | Taylor Series |
| Variance Adjustment | Degrees of Freedom (DF) |

| | |
|---|---|
| Number of Observations Read | 11789 |
| Number of Observations Used | 11789 |
| Sum of Weights Read | 52555987 |
| Sum of Weights Used | 52555987 |

Response Profile

| Ordered Value | resp10 | Total Frequency | Total Weight |
|---|---|---|---|
| 1 | 0 | 2387 | 9323578 |
| 2 | 1 | 9402 | 43232409 |

Probability modeled is resp10=1.

Class Level Information

| Class | Value | Design Variables | | | |
|---|---|---|---|---|---|
| selfrhealth_06 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 1 | 0 | 0 | 0 |
| | 3 | 0 | 1 | 0 | 0 |
| | 4 | 0 | 0 | 1 | 0 |
| | 5 | 0 | 0 | 0 | 1 |
| marcat_06 | 1 | 0 | 0 | | |
| | 2 | 1 | 0 | | |
| | 3 | 0 | 1 | | |
| racecat | 1 | 0 | 0 | 0 | |
| | 2 | 1 | 0 | 0 | |
| | 3 | 0 | 1 | 0 | |
| | 4 | 0 | 0 | 1 | |
| edcat | 1 | 0 | 0 | 0 | |
| | 2 | 1 | 0 | 0 | |
| | 3 | 0 | 1 | 0 | |
| | 4 | 0 | 0 | 1 | |

Logistic Regression with Response in 2010 as Outcome: Weight Adjustment Method for 2010
The SURVEYLOGISTIC Procedure

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

| Criterion | Intercept Only | Intercept and Covariates |
|---|---|---|
| AIC | 49132729 | 43706079 |
| SC | 49132745 | 43706347 |
| -2 Log L | 49132727 | 43706045 |

Testing Global Null Hypothesis: BETA=0

| Test | F Value | Num DF | Den DF | Pr > F |
|---|---|---|---|---|
| Likelihood Ratio | 357259 | 11.3432 | 635.22 | <.0001 |
| Score | 36.70 | 16 | 41 | <.0001 |
| Wald | 31.73 | 16 | 41 | <.0001 |

NOTE: Second-order Rao-Scott design correction
0.4105 applied to the Likelihood Ratio test.

Type 3 Analysis of Effects

| Effect | F Value | Num DF | Den DF | Pr > F |
|---|---|---|---|---|
| ln_inc06 | 1.45 | 1 | 56 | 0.2339 |
| selfrhealth_06 | 66.01 | 4 | 53 | <.0001 |
| age_06 | 297.29 | 1 | 56 | <.0001 |
| marcat_06 | 3.52 | 2 | 55 | 0.0364 |
| diabetes_06 | 5.10 | 1 | 56 | 0.0278 |
| arthritis_06 | 39.11 | 1 | 56 | <.0001 |
| racecat | 0.19 | 3 | 54 | 0.9018 |
| edcat | 0.62 | 3 | 54 | 0.6046 |

Analysis of Maximum Likelihood Estimates

| Parameter | | Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | | 6.0712 | 0.4177 | 14.53 | <.0001 |
| ln_inc06 | | 0.0291 | 0.0241 | 1.20 | 0.2339 |
| selfrhealth_06 | 2 | -0.1754 | 0.1280 | -1.37 | 0.1762 |
| selfrhealth_06 | 3 | -0.4479 | 0.1394 | -3.21 | 0.0022 |
| selfrhealth_06 | 4 | -0.8735 | 0.1234 | -7.08 | <.0001 |
| selfrhealth_06 | 5 | -1.6189 | 0.1466 | -11.04 | <.0001 |
| age_06 | | -0.0641 | 0.00372 | -17.24 | <.0001 |
| marcat_06 | 2 | -0.00117 | 0.0628 | -0.02 | 0.9851 |
| marcat_06 | 3 | -0.2803 | 0.1134 | -2.47 | 0.0165 |
| diabetes_06 | | -0.1475 | 0.0653 | -2.26 | 0.0278 |
| arthritis_06 | | 0.3111 | 0.0497 | 6.25 | <.0001 |
| racecat | 2 | -0.0506 | 0.1218 | -0.42 | 0.6795 |
| racecat | 3 | 0.0227 | 0.1298 | 0.18 | 0.8615 |
| racecat | 4 | -0.0452 | 0.2847 | -0.16 | 0.8745 |

NOTE: The degrees of freedom for the t tests is 56.

Logistic Regression with Response in 2010 as Outcome: Weight Adjustment Method for 2010
The SURVEYLOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

| Parameter | | Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|---|
| edcat | 2 | 0.0490 | 0.0729 | 0.67 | 0.5047 |
| edcat | 3 | 0.0786 | 0.0752 | 1.05 | 0.3003 |
| edcat | 4 | 0.0675 | 0.0813 | 0.83 | 0.4103 |

NOTE: The degrees of freedom for the t tests is 56.

Odds Ratio Estimates

| Effect | | | Point Estimate | 95% Confidence Limits | |
|---|---|---|---|---|---|
| ln_inc06 | | | 1.029 | 0.981 | 1.080 |
| selfrhealth_06 | 2 | vs 1 | 0.839 | 0.649 | 1.084 |
| selfrhealth_06 | 3 | vs 1 | 0.639 | 0.483 | 0.845 |
| selfrhealth_06 | 4 | vs 1 | 0.418 | 0.326 | 0.535 |
| selfrhealth_06 | 5 | vs 1 | 0.198 | 0.148 | 0.266 |
| age_06 | | | 0.938 | 0.931 | 0.945 |
| marcat_06 | 2 | vs 1 | 0.999 | 0.881 | 1.133 |
| marcat_06 | 3 | vs 1 | 0.756 | 0.602 | 0.948 |
| diabetes_06 | | | 0.863 | 0.757 | 0.983 |
| arthritis_06 | | | 1.365 | 1.235 | 1.508 |
| racecat | 2 | vs 1 | 0.951 | 0.745 | 1.213 |
| racecat | 3 | vs 1 | 1.023 | 0.789 | 1.327 |
| racecat | 4 | vs 1 | 0.956 | 0.540 | 1.691 |
| edcat | 2 | vs 1 | 1.050 | 0.907 | 1.215 |
| edcat | 3 | vs 1 | 1.082 | 0.931 | 1.258 |
| edcat | 4 | vs 1 | 1.070 | 0.909 | 1.259 |

NOTE: The degrees of freedom in computing the confidence limits is 56.

Association of Predicted Probabilities and Observed Responses

| | | | |
|---|---|---|---|
| Percent Concordant | 72.7 | Somers' D | 0.457 |
| Percent Discordant | 26.9 | Gamma | 0.459 |
| Percent Tied | 0.4 | Tau-a | 0.148 |
| Pairs | 22442574 | c | 0.729 |

Mean Income Difference using Adjusted Weight

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DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR) Design
Sample Weight: ADJ_KWGTR
Stratification Variables(s): STRATUM
Primary Sampling Unit: SECU

Number of observations read : 11789 Weighted count : 65949787
Denominator degrees of freedom : 56

Date: 05-20-2017 SUDAAN Page: 1
Time: 12:48:24 Table: 1

Variance Estimation Method: Taylor Series (WR)
by: Variable, SUDAAN Reserved Variable One.

| Variable | | SUDAAN Reserved Variable One | |
|---|---|---|---|
| | | Total | 1 |
| INCDIFF_06_10 | Mean | -6119.970 | -6119.970 |
| | SE Mean | 1702.965 | 1702.965 |
| | Lower 95% Limit Mean | -9531.419 | -9531.419 |
| | Upper 95% Limit Mean | -2708.521 | -2708.521 |

3. Multiple Imputation, MI of 2010 log-income

The MEANS Procedure

| Variable | N | N Miss | Mean | Minimum | Maximum |
|---|---|---|---|---|---|
| ln_inc10 | 9402 | 2387 | 10.2634346 | 0 | 14.9225145 |
| ln_inc06 | 11789 | 0 | 10.2909710 | 0 | 17.0486936 |
| selfrhealth_06 | 11789 | 0 | 2.9179744 | 1.0000000 | 5.0000000 |
| age_06 | 11789 | 0 | 69.5194673 | 52.0000000 | 104.0000000 |
| marcat_06 | 11789 | 0 | 1.5744338 | 1.0000000 | 3.0000000 |
| diabetes_06 | 11789 | 0 | 0.2129103 | 0 | 1.0000000 |
| arthritis_06 | 11789 | 0 | 0.6252439 | 0 | 1.0000000 |
| racecat | 11789 | 0 | 2.1140046 | 1.0000000 | 4.0000000 |
| edcat | 11789 | 0 | 2.3958775 | 1.0000000 | 4.0000000 |
| STRATUM | 11789 | 0 | 30.6344898 | 1.0000000 | 56.0000000 |
| kwgtr_dec | 11789 | 0 | 4.4854525 | 0 | 9.0000000 |
| incdiff_06_10 | 9402 | 2387 | -6124.49 | -12310617.60 | 2062968.00 |

3. Multiple Imputation, MI of 2010 log-income

The MI Procedure

Model Information

| | |
|---|---|
| Data Set | WORK.WT_DECILES_1 |
| Method | FCS |
| Number of Imputations | 5 |
| Number of Burn-in Iterations | 5 |
| Seed for random number generator | 41279 |

FCS Model Specification

| Method | Imputed Variables |
|---|---|
| Regression | ln_inc10 ln_inc06 age_06 diabetes_06 arthritis_06 |
| Discriminant Function | selfrhealth_06 marcat_06 racecat edcat STRATUM kwgtr_dec |

Missing Data Patterns

| Group | ln_inc10 | ln_inc06 | selfrhealth_06 | age_06 | marcat_06 | diabetes_06 | arthritis_06 | racecat | edcat | STRATUM | kwgtr_dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | X | X | X | X | X | X | X | X | X | X | X |
| 2 | . | X | X | X | X | X | X | X | X | X | X |

Missing Data Patterns

| | | | Group Means | | | | |
|---|---|---|---|---|---|---|---|
| Group | Freq | Percent | ln_inc10 | ln_inc06 | age_06 | diabetes_06 | arthritis_06 |
| 1 | 9402 | 79.75 | 10.263435 | 10.360857 | 68.071581 | 0.200383 | 0.615826 |
| 2 | 2387 | 20.25 | . | 10.015701 | 75.222455 | 0.262254 | 0.662338 |

Variance Information (5 Imputations)

| | Variance | | | | Relative Increase | Fraction Missing | Relative |
|---|---|---|---|---|---|---|---|
| Variable | Between | Within | Total | DF | in Variance | Information | Efficiency |
| ln_inc10 | 0.000038210 | 0.000191 | 0.000237 | 105.86 | 0.239616 | 0.207959 | 0.960069 |

Parameter Estimates (5 Imputations)

| Variable | Mean | Std Error | 95% Confidence Limits | | DF | Minimum | Maximum | Mu0 |
|---|---|---|---|---|---|---|---|---|
| ln_inc10 | 10.196018 | 0.015402 | 10.16548 | 10.22655 | 105.86 | 10.187287 | 10.200758 | 0 |

Parameter Estimates (5 Imputations)

| Variable | t for H0: Mean=Mu0 | Pr > \|t\| |
|---|---|---|
| ln_inc10 | 662.01 | <.0001 |

3. Multiple Imputation, MI of 2010 log-income

The MEANS Procedure

| Variable | N | Mean | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| incdiff_06_10 | 9402 | -6124.49 | 168492.04 | -12310617.60 | 2062968.00 |
| ln_inc10 | 9402 | 10.2634346 | 1.4977891 | 0 | 14.9225145 |

3. Multiple Imputation, MI of 2010 log-income

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DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR) Design
Sample Weight: KWGTR
Stratification Variables(s): STRATUM
Primary Sampling Unit: SECU

Processing data for set 1 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 2 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 3 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 4 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56

Processing data for set 5 of imputed variables:

Number of observations read : 11789 Weighted count : 52555987
Denominator degrees of freedom : 56



Variance Estimation Method: Taylor Series (WR) Using Multiply Imputed Data
Results for Summary Over All Imputations
by: Variable, SUDAAN Reserved Variable One.

| Variable | | SUDAAN Reserved Variable One | |
|---|---|---|---|
| | | Total | 1 |
| NEW_CHG0610 | Mean | -3765.357 | -3765.357 |
| | SE Mean | 3016.690 | 3016.690 |
| | Lower 95% Limit Mean | -9826.165 | -9826.165 |
| | Upper 95% Limit Mean | 2295.452 | 2295.452 |

4. Calibration: Cross-Class distributions
Estimate mean change using complete cases. Table 11.3

**NOTE: SAS OUTPUT EXCLUDED FROM THIS DOCUMENT, REFER TO SAS C11 EXAMPLES/OUTPUT FOR DETAILS.**

```
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            Software for the Statistical Analysis of Correlated Data
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                                Release 11.0.1
DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR)
Design
    Sample Weight: KWGTR_CAL
    Stratification Variables(s): STRATUM
    Primary Sampling Unit: SECU
Number of observations read    :   9402    Weighted count : 52555987
Number of observations skipped :   2387
(WEIGHT variable nonpositive)
Denominator degrees of freedom :     56


Date: 05-20-2017                                          SUDAAN                                                Page:   1
Time: 12:54:06                                                                                                  Table: 1
Variance Estimation Method: Taylor Series (WR)
by: Variable, SUDAAN Reserved Variable One.
```

| Variable | | SUDAAN Reserved Variable One | |
|---|---|---|---|
| | | Total | 1 |
| INCDIFF_06_10 | Mean | -6341.657 | -6341.657 |
| | SE Mean | 1780.599 | 1780.599 |
| | Lower 95% Limit | | |
| | Mean | -9908.626 | -9908.626 |
| | Upper 95% Limit | | |
| | Mean | -2774.688 | -2774.688 |

**Analysis of 3+ Waves of Data**

1. **Weighted Multi-Level Model, Not Available in Sudaan**

2. **Viega method, Not Available in Sudaan**

3. **GEE Weighted Model, see below**

**NOTE: SAS OUTPUT EXCLUDED, SEE SAS C11 DOCUMENT FOR FULL DETAILS**

GEE Model with Repeated Measures Per Individual (Financial Respondent), 2006-2012

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Software for the Statistical Analysis of Correlated Data
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Release 11.0.1

DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With Replacement (WR)
Design
Sample Weight: CASEWT
Stratification Variables(s): _ONE_
Primary Sampling Unit: NEWID_NUM
Cluster Identification Variables: _ONE_ NEWID_NUM

Number of observations read : 47156 Weighted count:1772364113
Observations used in the analysis : 40325 Weighted count:1098056982
Denominator degrees of freedom : 11788

Maximum number of estimable parameters for the model is 61

File HRS_LONG_1 contains 11789 Clusters
11789 clusters were used to fit the model
Maximum cluster size is 4 records
Minimum cluster size is 1 records

Weighted mean response is 10.372760

Multiple R-Square for the dependent variable LN_INC: 0.075919

Date: 05-20-2017 SUDAAN Page: 1
Time: 13:27:59 Table: 1

Frequencies and Values for CLASS Variables
by: Gender 1=Male 2=Female.

| Gender 1=Male 2=Female | Frequency | Value |
|---|---|---|
| Ordered Position: 1 | 20556 | 1 |
| Ordered Position: 2 | 26600 | 2 |

Frequencies and Values for CLASS Variables
by: STRATUM ID.

| STRATUM ID | Frequency | Value |
|---|---|---|
| Ordered Position: 1 | 780 | 1 |
| Ordered Position: 2 | 752 | 2 |
| Ordered Position: 3 | 604 | 3 |
| Ordered Position: 4 | 636 | 4 |
| Ordered Position: 5 | 644 | 5 |
| Ordered Position: 6 | 744 | 6 |
| Ordered Position: 7 | 928 | 7 |
| Ordered Position: 8 | 1100 | 8 |
| Ordered Position: 9 | 724 | 9 |
| Ordered Position: 10 | 648 | 10 |
| Ordered Position: 11 | 576 | 11 |
| Ordered Position: 12 | 532 | 12 |
| Ordered Position: 13 | 408 | 13 |
| Ordered Position: 14 | 416 | 14 |
| Ordered Position: 15 | 412 | 15 |
| Ordered Position: 16 | 424 | 16 |
| Ordered Position: 17 | 620 | 17 |

Frequencies and Values for CLASS Variables
by: STRATUM ID.

| STRATUM ID | Frequency | Value |
|---|---|---|
| Ordered Position: 18 | 436 | 18 |
| Ordered Position: 19 | 472 | 19 |
| Ordered Position: 20 | 704 | 20 |
| Ordered Position: 21 | 776 | 21 |
| Ordered Position: 22 | 348 | 22 |
| Ordered Position: 23 | 324 | 23 |
| Ordered Position: 24 | 272 | 24 |
| Ordered Position: 25 | 312 | 25 |
| Ordered Position: 26 | 1072 | 26 |
| Ordered Position: 27 | 1248 | 27 |
| Ordered Position: 28 | 1120 | 28 |
| Ordered Position: 29 | 1428 | 29 |
| Ordered Position: 30 | 1428 | 30 |
| Ordered Position: 31 | 1356 | 31 |
| Ordered Position: 32 | 1068 | 32 |
| Ordered Position: 33 | 1692 | 33 |
| Ordered Position: 34 | 1168 | 34 |

Frequencies and Values for CLASS Variables
by: STRATUM ID.

| STRATUM ID | Frequency | Value |
|---|---|---|
| Ordered Position: 35 | 512 | 35 |
| Ordered Position: 36 | 812 | 36 |
| Ordered Position: 37 | 696 | 37 |
| Ordered Position: 38 | 948 | 38 |
| Ordered Position: 39 | 916 | 39 |
| Ordered Position: 40 | 1520 | 40 |
| Ordered Position: 41 | 1244 | 41 |
| Ordered Position: 42 | 1252 | 42 |
| Ordered Position: 43 | 1192 | 43 |
| Ordered Position: 44 | 1236 | 44 |
| Ordered Position: 45 | 1664 | 45 |
| Ordered Position: 46 | 1948 | 46 |
| Ordered Position: 47 | 1516 | 47 |
| Ordered Position: 48 | 848 | 48 |
| Ordered Position: 49 | 1060 | 49 |
| Ordered Position: 50 | 1412 | 50 |
| Ordered Position: 51 | 1068 | 51 |

Frequencies and Values for CLASS Variables
by: STRATUM ID.

| STRATUM ID | Frequency | Value |
|---|---|---|
| Ordered Position: 52 | 528 | 52 |
| Ordered Position: 53 | 152 | 53 |
| Ordered Position: 54 | 64 | 54 |
| Ordered Position: 55 | 212 | 55 |
| Ordered Position: 56 | 184 | 56 |

Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Exchangeable
Link Function: Identity
Response variable LN_INC: LN_INC
by: Independent Variables and Effects.

| Independent Variables and Effects | Beta Coeff. | SE Beta | Lower 95% Limit Beta | Upper 95% Limit Beta | T-Test B=0 | P-value T-Test B=0 |
|---|---|---|---|---|---|---|
| Intercept | 9.7926 | 0.4419 | 8.9264 | 10.6588 | 22.1596 | 0.0000 |
| YRSSINCE06 | -0.0715 | 0.0437 | -0.1570 | 0.0141 | -1.6373 | 0.1016 |
| Gender 1=Male 2=Female | | | | | | |
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
| 2 | -0.6276 | 0.1035 | -0.8306 | -0.4247 | -6.0619 | 0.0000 |
| YRS06SQ | 0.0022 | 0.0073 | -0.0121 | 0.0164 | 0.2958 | 0.7674 |
| YRSSINCE06, Gender 1=Male 2=Female | | | | | | |
| 1, 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
| 1, 2 | 0.0697 | 0.0752 | -0.0776 | 0.2171 | 0.9278 | 0.3535 |
| YRS06SQ, Gender 1=Male 2=Female | | | | | | |
| 1, 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
| 1, 2 | -0.0043 | 0.0121 | -0.0279 | 0.0193 | -0.3549 | 0.7227 |
| STRATUM ID | | | | | | |
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
| 2 | 0.2848 | 0.4942 | -0.6840 | 1.2536 | 0.5762 | 0.5645 |
| 3 | 0.8065 | 0.5005 | -0.1745 | 1.7876 | 1.6115 | 0.1071 |
| 4 | -0.3481 | 1.2279 | -2.7549 | 2.0587 | -0.2835 | 0.7768 |
| 5 | 0.5880 | 1.7245 | -2.7923 | 3.9683 | 0.3410 | 0.7331 |
| 6 | 0.9413 | 0.6089 | -0.2522 | 2.1348 | 1.5460 | 0.1221 |
| 7 | 1.5009 | 0.5118 | 0.4977 | 2.5041 | 2.9326 | 0.0034 |
| 8 | 0.9616 | 0.4834 | 0.0140 | 1.9092 | 1.9891 | 0.0467 |
| 9 | 0.7304 | 0.5193 | -0.2875 | 1.7484 | 1.4065 | 0.1596 |
| 10 | 1.5048 | 0.4618 | 0.5996 | 2.4100 | 3.2587 | 0.0011 |
| 11 | 0.2492 | 0.8001 | -1.3192 | 1.8176 | 0.3114 | 0.7555 |
| 12 | 1.2207 | 0.5482 | 0.1462 | 2.2952 | 2.2269 | 0.0260 |
| 13 | 1.0580 | 0.5305 | 0.0181 | 2.0978 | 1.9944 | 0.0461 |
| 14 | 0.9756 | 0.4720 | 0.0503 | 1.9009 | 2.0668 | 0.0388 |
| 15 | 0.8203 | 0.5202 | -0.1993 | 1.8400 | 1.5770 | 0.1148 |
| 16 | 0.8512 | 0.4583 | -0.0471 | 1.7495 | 1.8575 | 0.0633 |
| 17 | 1.3197 | 0.4837 | 0.3716 | 2.2677 | 2.7285 | 0.0064 |
| 18 | 1.4078 | 0.4938 | 0.4398 | 2.3758 | 2.8508 | 0.0044 |
| 19 | 1.0957 | 0.6575 | -0.1931 | 2.3845 | 1.6665 | 0.0956 |
| 20 | 1.1338 | 0.7520 | -0.3402 | 2.6079 | 1.5077 | 0.1317 |
| 21 | 1.1824 | 0.4548 | 0.2908 | 2.0739 | 2.5996 | 0.0093 |
| 22 | 1.1323 | 0.4925 | 0.1668 | 2.0978 | 2.2989 | 0.0215 |
| 23 | 0.5576 | 0.5125 | -0.4469 | 1.5622 | 1.0881 | 0.2766 |
| 24 | 0.9571 | 0.5330 | -0.0877 | 2.0020 | 1.7957 | 0.0726 |
| 25 | 0.9530 | 0.4582 | 0.0548 | 1.8512 | 2.0799 | 0.0376 |
| 26 | 1.2453 | 0.5392 | 0.1883 | 2.3022 | 2.3094 | 0.0209 |
| 27 | 1.2540 | 0.4690 | 0.3347 | 2.1734 | 2.6738 | 0.0075 |
| 28 | 1.0051 | 0.4677 | 0.0883 | 1.9220 | 2.1489 | 0.0317 |
| 29 | 1.3047 | 0.4838 | 0.3564 | 2.2530 | 2.6968 | 0.0070 |
| 30 | 0.9734 | 0.4806 | 0.0314 | 1.9154 | 2.0255 | 0.0428 |
| 31 | 1.1453 | 0.4671 | 0.2297 | 2.0609 | 2.4519 | 0.0142 |

Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Exchangeable
Link Function: Identity
Response variable LN_INC: LN_INC
by: Independent Variables and Effects.

| Independent Variables and Effects | Beta Coeff. | SE Beta | Lower 95% Limit Beta | Upper 95% Limit Beta | T-Test B=0 | P-value T-Test B=0 |
|---|---|---|---|---|---|---|
| STRATUM ID | | | | | | |
| 32 | 1.0158 | 0.6311 | -0.2212 | 2.2529 | 1.6096 | 0.1075 |
| 33 | 0.9320 | 0.5853 | -0.2152 | 2.0792 | 1.5924 | 0.1113 |
| 34 | 0.4092 | 0.4593 | -0.4910 | 1.3094 | 0.8910 | 0.3730 |
| 35 | 1.1942 | 0.5098 | 0.1950 | 2.1935 | 2.3427 | 0.0192 |
| 36 | 0.8442 | 0.6287 | -0.3882 | 2.0766 | 1.3427 | 0.1794 |
| 37 | 0.7623 | 0.4561 | -0.1318 | 1.6563 | 1.6712 | 0.0947 |
| 38 | 1.3815 | 0.5419 | 0.3194 | 2.4436 | 2.5496 | 0.0108 |
| 39 | 0.9673 | 0.4654 | 0.0551 | 1.8795 | 2.0785 | 0.0377 |
| 40 | 1.4352 | 0.4607 | 0.5322 | 2.3383 | 3.1154 | 0.0018 |
| 41 | 1.3536 | 0.5114 | 0.3511 | 2.3561 | 2.6467 | 0.0081 |
| 42 | 0.6975 | 0.4737 | -0.2311 | 1.6261 | 1.4724 | 0.1409 |
| 43 | 1.0745 | 0.4825 | 0.1288 | 2.0203 | 2.2270 | 0.0260 |
| 44 | 1.1751 | 0.4681 | 0.2576 | 2.0926 | 2.5105 | 0.0121 |
| 45 | 1.3916 | 0.4619 | 0.4862 | 2.2971 | 3.0127 | 0.0026 |
| 46 | 1.1033 | 0.4768 | 0.1687 | 2.0380 | 2.3140 | 0.0207 |
| 47 | 0.6889 | 0.4566 | -0.2061 | 1.5840 | 1.5087 | 0.1314 |
| 48 | 0.9515 | 0.4614 | 0.0471 | 1.8558 | 2.0623 | 0.0392 |
| 49 | 0.3424 | 0.6176 | -0.8682 | 1.5530 | 0.5544 | 0.5793 |
| 50 | 0.8026 | 0.4597 | -0.0984 | 1.7036 | 1.7460 | 0.0808 |
| 51 | 0.9777 | 0.4917 | 0.0139 | 1.9415 | 1.9884 | 0.0468 |
| 52 | 0.1051 | 0.5013 | -0.8776 | 1.0878 | 0.2097 | 0.8339 |
| 53 | 1.0319 | 0.4845 | 0.0822 | 1.9816 | 2.1298 | 0.0332 |
| 54 | 0.3110 | 0.6231 | -0.9103 | 1.5323 | 0.4992 | 0.6177 |
| 55 | 0.3495 | 0.5227 | -0.6750 | 1.3741 | 0.6687 | 0.5037 |
| 56 | 1.3827 | 0.4813 | 0.4392 | 2.3262 | 2.8725 | 0.0041 |



Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Exchangeable
Link Function: Identity
Response variable LN_INC: LN_INC
by: Contrast.

| Contrast | Degrees of Freedom | Wald ChiSq | P-value Wald ChiSq |
|---|---|---|---|
| OVERALL MODEL | 61.0000 | ********** | 0.0000 |
| MODEL MINUS INTERCEPT | 60.0000 | 237.9768 | 0.0000 |
| INTERCEPT | . | . | . |
| YRSSINCE06 | . | . | . |
| GENDER | 1.0000 | 36.7468 | 0.0000 |
| YRS06SQ | . | . | . |
| YRSSINCE06 * GENDER | 1.0000 | 0.8608 | 0.3535 |
| YRS06SQ * GENDER | 1.0000 | 0.1259 | 0.7227 |
| STRATUM | 55.0000 | 147.4921 | 0.0000 |