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%let seed_lu = %eval(&seed*4) ;
/*
proc import file = "&par_path/parameters_LU_model2.csv" out = par_lu
dbms=csv replace ;
guessingrows=max ;
run ;*/

data par_lu ;
infile "&par_path/parameters_LU_model2.csv" DSD MISSOVER delimiter =
", " termstr = CRLF lrecl = 32767 firstobs = 2 ;
informat variable $15. ;
informat estimate BEST12. ;
informat stderr BEST12. ;
informat tvalue BEST12. ;
informat probt $10. ;
format variable $15. ;
format estimate BEST12. ;
format stderr BEST12. ;
format tvalue BEST12. ;
format probt $10. ;
input variable $
      estimate
      stderr
      tvalue
      probt $ ;
run ;
/*
proc import file = "&par_path/vres_LU_model2.csv" out = v_lu
dbms=csv replace ;
run ;*/

data v_lu ;
infile "&par_path/vres_LU_model2.csv" DSD MISSOVER delimiter = ", "
termstr = CRLF lrecl = 32767 firstobs = 2 ;
informat v BEST12. ;
format v BEST12. ;
input v ;
run ;

data _null_ ;
set v_lu ;
call symput("sd",sqrt(v)) ;
run ;

/* generate u following a uniform law */

proc sort data = h_lu ;
by sa0100 sa0010 im0100 ;
run ;

data h_lu ;
set h_lu ;
retain x1 &seed_lu x2 0 ;
if _n_ = 1 then do ;
    x1 = &seed_lu ;
    x2 = 0 ;
end ;

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else do ;
    y = mod(x1*20077+12345,65536) ;
    x2 = mod(int((x1*20077+12345-y)/65536)+mod(16838*x1+20077
*x2,65536),32768) ;
    x1 = y ;
end ;
z = 65536*x2+x1 ;
u = z/2147483648 ;
drop y z x1 x2 ;
run ;

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/* compute the consumption */

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data par_lu ;
set par_lu ;
call symput(compress("par"!!_n_),estimate) ;
run ;

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data h_lu ;
set h_lu ;
/* reshape covariates */
cfood = hi0100*12 ;
cresto = hi0200*12 ;
rent = max(hb2300*12,0) ;
l_cfood = log(max(cfood,1)) ;
l_cresto = log(max(cresto,1)) ;
l_rent = log(max(rent,1)) ;
head_male = (ra0200 = 1) ;
owner_or_free = (hb0300 in (1,2,4)) ;
hysize_1 = (dh0001 = 1) ;
hysize_3 = (dh0001 >= 3) ;
agerp_1 = (ra0300 < 30) ;
agerp_2 = (30 <= ra0300 < 40) ;
agerp_3 = (40 <= ra0300 < 50) ;
agerp_4 = (50 <= ra0300 < 60) ;
agerp_5 = (60 <= ra0300 < 70) ;
agerp_6 = (ra0300 >= 70) ;
number_children_1 = (number_children = 1) ;
number_children_2 = (number_children = 2) ;
number_children_3 = (number_children = 3) ;
labour_status_1 = (pe0100a in (1,2)) ;
labour_status_2 = (pe0100a in (3,4,6,7,8,9)) ;
labour_status_3 = (pe0100a = 5) ;
diploma_1 = (pa0200 = 1) ;
diploma_2 = (pa0200 = 2) ;
diploma_5 = (pa0200 = 5) ;
run ;

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proc sort data = h_lu ;
by im0100 ;
run ;

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proc univariate data = h_lu ;
by im0100 ;
var di2000 ;
weight hw0010 ;
output out = perc_implicates pctlpts = 20 40 60 80 pctlpre=p ;
run ;

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proc univariate data = perc_implicates ;
var p20 p40 p60 p80 ;
output out = perc mean = p20 p40 p60 p80 ;
run ;

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data perc;
set perc ;
call symput("quint1",p20) ;
call symput("quint2",p40) ;
call symput("quint3",p60) ;
call symput("quint4",p80) ;
run ;

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data h_lu ;
set h_lu ;
income_quintile_1 = (di2000 <= &quint1) ;
income_quintile_2 = (&quint1 < di2000 <= &quint2) ;
income_quintile_3 = (&quint2 < di2000 <= &quint3) ;
income_quintile_4 = (&quint3 < di2000 <= &quint4) ;
income_quintile_5 = (di2000 > &quint4) ;
run ;

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/* set up bounds */
/*
proc import file = "&par_path/bound_LU.csv" out = bound_lu dbms=csv
replace ;
run ;*/

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```

data bound_lu ;
infile "&par_path/bound_LU.csv" DSD MISSOVER delimiter = "," termstr
= CRLF lrecl = 32767 firstobs = 2 ;
informat m BEST12. ;
format m BEST12. ;
input m ;
run ;

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data _null_ ;
set bound_lu ;
call symput("m",m) ;
run ;

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/* compute consumption */

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data h_lu ;
set h_lu ;
/* bounds */
lbound = cfood+cresto+rent ;

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ubound = &m ;
a = log(lbound) ;
b = log(ubound) ;
Xbeta = &par1+&par2*l_cfood+&par3*(l_cfood**2)+&par4*(l_cfood**3)
        +&par5*income_quintile_2+&par6*income_quintile_3+&par7
*income_quintile_4+&par8*income_quintile_5
        +&par9*l_cfood*income_quintile_2+&par10*(l_cfood**2)
*income_quintile_2+&par11*(l_cfood**3)*income_quintile_2
        +&par12*l_cfood*income_quintile_3+&par13*(l_cfood**2)
*income_quintile_3+&par14*(l_cfood**3)*income_quintile_3
        +&par15*l_cfood*income_quintile_4+&par16*(l_cfood**2)
*income_quintile_4+&par17*(l_cfood**3)*income_quintile_4
        +&par18*l_cfood*income_quintile_5+&par19*(l_cfood**2)
*income_quintile_5+&par20*(l_cfood**3)*income_quintile_5
        +&par21*l_cresto+&par22*(l_cresto**2)+&par23*(l_cresto**3)
        +&par24*l_rent+&par25*(l_rent**2)+&par26*(l_rent**3)
        +&par27*agerp_1+&par28*agerp_2+&par29*agerp_4+&par30*agerp_5
+&par31*agerp_6
        +&par32*head_male
        +&par33*owner_or_free
        +&par34*hhsz_1+&par35*hhsz_3
        +&par36*number_children_1+&par37*number_children_2+&par38
*number_children_3
        +&par39*diploma_1+&par40*diploma_2+&par41*diploma_5
        +&par42*labour_status_2+&par43*labour_status_3 ;
Phi_a = cdf('NORMAL',a-Xbeta,0,&sd) ;
Phi_b = cdf('NORMAL',b-Xbeta,0,&sd) ;
/* estimation of consumption */
/*alpha = a/&sd ;
beta = b/&sd ;
correction_mean = &sd*(pdf('NORMAL',alpha) - pdf('NORMAL',beta))/
(cdf('NORMAL',beta) - cdf('NORMAL',alpha)) ;
correction_sd = 1+(alpha*pdf('NORMAL',alpha)-beta*pdf
('NORMAL',beta))/(cdf('NORMAL',beta) - cdf('NORMAL',alpha))-((pdf
('NORMAL',alpha)-pdf('NORMAL',beta))/(cdf('NORMAL',beta) - cdf
('NORMAL',alpha)))*2 ;*/
DI3001 = round(exp(Xbeta+quantile('NORMAL',Phi_a + (Phi_b-Phi_a)
*u,0,&sd))) ;
run ;

```