EUSMEX Stata Conference 2020

An application to tobacco tax reforms using SIDS and DUVM Stata commands.

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October 14th, 2021

Outline

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II. Deaton's (1988) Unit Value Model
III. The Deaton's theoretical model
IV. The empirical implementation and estimation
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VI. Examples of sids & duvm modules from matching two surveys:
    The ENIGH & ENSANUT 2018
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I. The goals

The aim is twofold:

1. To recall briefly the most popular Deaton Unit Value models (DUVM) and, especially to focus on the computational framework of the Stata codes.
2. To show an empirical application with the use of two commands (`sids.ado` & `duvm.ado`) and the match of two Mexican surveys for the estimations of price elasticities.

II. Deaton's (1988) Unit Value Model

- Estimating a demand system requires information on the household expenditures at different price levels. Price can vary spatially or temporally.
- Scarcity of accurate price data justifies switching to what is known as the *unit value model*.
- For the case of large consumption groups with weak separability, Deaton (1988) developed a model to estimate the price and income elasticities by using unit values.
- The model enables to compensate for the quality effect as well.

III. The Deaton's theoretical model

Let E_c denotes the household expenditures on the group of items *c*, *pc* and *qc* are vectors denoting the prices and the quantities of the group:

$$E_c = p_c q_c \qquad (01)$$

Within the group of commodities *c*, let λ_c denotes the proxy unique price, so:

$$E_c = \lambda_c v_c Q_c \qquad (02)$$

For the same level of expenditures E_c the aggregated quantity within the group *c* (Q_c) will depend on the quality of bought goods, v_c, the estimated unit value is:

$$V_c = \frac{E_c}{Q_c} = \lambda_c v_c$$

III. The Deaton's theoretical model

The price elasticity is defined as follows:

$$e_c = \frac{\partial Q_c}{\partial \lambda_c} = \frac{\partial \ln Q_c}{\partial \ln V_c}\left(1 + \frac{\partial \ln v_c}{\partial \ln \lambda_c}\right) \qquad (03)$$

Deaton (1988) proposes the adoption of the weak separable utility function with demands:

$$q_c = f_c\left(\frac{E_c}{\lambda_c}, p_c^*\right) \qquad (04)$$

The consumer selects in the first stage the –normalized- budget $\frac{E_c}{\lambda_c}$ depending on the vector of the prevailed prices according to the quality (p_{c*}), the consumer will select the levels of expenditures on goods *c* as:

$$\frac{\partial \ln v_c}{\partial \ln \lambda_c} = \frac{\frac{\partial \ln v_c}{\partial \ln x}\frac{\partial \ln Q_c}{\partial \ln \lambda_c}}{\frac{\partial \ln Q_c}{\partial \ln x}} \qquad (05)$$

IV. The empirical implementation and estimation

We assume that the quality effect is nil or can be neglected. As suggested by Deaton (1988), the simple model with the weak separability assumption is as follows:

$$w_{c,i} = \alpha_0 + \beta_0 x_i + \gamma_0 z_i + \phi_0 \ln(V_{c,i}) + u_{0,i} \qquad (06)$$

where:

$W_{c,i}$: The budget share of group c.

x_i : The household income.

z_i : Household characteristics

$V_{c,i}$: Unit value of group c.

$$e_c = \frac{\partial Q_c}{\partial \lambda_c} = \left(\frac{\frac{\partial \ln w_c}{\partial \ln V_c}}{w_c} - 1 \right) \left(1 + \frac{\partial \ln v_c}{\partial \ln \lambda_c} \right) \qquad (07)$$

$\boldsymbol{e_c}$ stands for the elasticities assuming that the quality is correlated with the price changes $\frac{dlnV_c}{d\lambda_c} \neq 0$

IV. The empirical implementation and estimation

Assuming that the quality is uncorrelated with the price changes we have $\frac{dlnV_c}{d\lambda_c} = 0$, elasticities are computed as :

$$\hat{e}_c = \left(\frac{\hat{\phi}_0}{\overline{w}_c} - 1\right) \qquad (08)$$

The case where is not nil $\frac{dlnV_c}{d\lambda_c} \neq 0$ wiith the assumption of weak separability, we have that:

$$e_c = \frac{\boldsymbol{\partial Q_c}}{\boldsymbol{\partial \lambda_c}} = \left(\frac{\frac{\partial \ln w_c}{\partial \ln V_c}}{w_c} - 1\right)\left(1 + \frac{\frac{\partial \ln v_c}{\partial \ln x}\frac{\boldsymbol{\partial \ln Q_c}}{\boldsymbol{\partial \ln \lambda_c}}}{\frac{\partial \ln Q_c}{\partial \ln x}}\right) \qquad (09)$$

IV. The empirical implementation and estimation

Deaton recommends three steps to estimate the parameters and the elasticities:

Step 1: using the simultaneous equations, we estimate the components $\frac{dlnv_c}{dlnx}$ and $\frac{dlnQ_c}{dlnx}$,

$$w_{c,i} = \alpha_1 + \beta_1 x_i + \gamma_1 z_i + f_c + u_{1,i} \quad (10)$$

$$\ln(V_{c,i}) = \alpha_2 + \beta_2 x_i + \gamma_2 z_i + f_c + u_{2,i} \quad (11)$$

Where f_c is the fixed effect of the group c.

Step 2: estimating the component $\frac{dlnW_c}{dlnV_c}$ by using the average predicted values of $w_{c,i}$ and $V_{c,i}$ at the cluster level and this using the following model

$$\tilde{w}_c = \alpha_3 + \phi_3 \ln(\tilde{V}_{c,i}) + u_3 \quad (12)$$

IV. The empirical implementation and estimation

$$\tilde{w}_c = \alpha_3 + \phi_3 \ln(\tilde{V}_{c,i}) + u_3 \qquad (12)$$

- The estimation at this second stage is not by OLS.
- Deaton (1988) uses the correlation between the first stage residuals to estimate the severity of the measurement error. This is used to adjust the estimates and to correct for the structural correlation between quantity and unit value.

Step 3: Solving the equation (09) to get elasticities for the argument $\frac{dQ_c}{d\lambda_c}$, when $\frac{dlnV_c}{d\lambda_c} \neq 0$ (no nil) and quality is correlated with price changes.

V. The SIDS and DUVM Stata modules syntax

- **`sids`** and **`duvm`** are ado files included in WELCOM Stata package.
- The Deaton (1997) book included a set of the Stata do files, which were updated in the WELCOM package and converted into an ado files to perform the estimation of unit value models.

Among the improvements done:

1. The possibility of using the sampling weight to consider the level of representativeness of each observation;
2. The possibility of tacking into account for the nil expenditures using the Heckman approach, or in short, the IMR component in the estimation;
3. Producing the elasticities for different population subgroups (i.e. deciles, sex, schooling; age …);
4. The use of dialog box, saving the information of the dialog box;
5. Saving results in the Excel format.

V. The SIDS and DUVM Stata modules syntax

- Installing the welcom package

In the Stata command window, type the following commands:

```
. set more off
. net from http://dasp.ecn.ulaval.ca/welcom/Installer36
. net install welcom_p1,   force
. net install welcom_p2,   force
. net install welcom_p3,   force
. net install welcom_p4,   force
. net get     welcom_data, force
. cap addITMenu profile.do _welcom_menu
```

V. The SIDS Stata command

Description

The sids module is conceived to estimate the price elasticity by quintiles, and deciles.

sids varlist (3 varnames) , [incpar(varname) hgroup(varname) incint(int) inc(int) indcat(varlist) indcon(varlist) dregres(int) dgra(int) dec(int) xfil(string)]

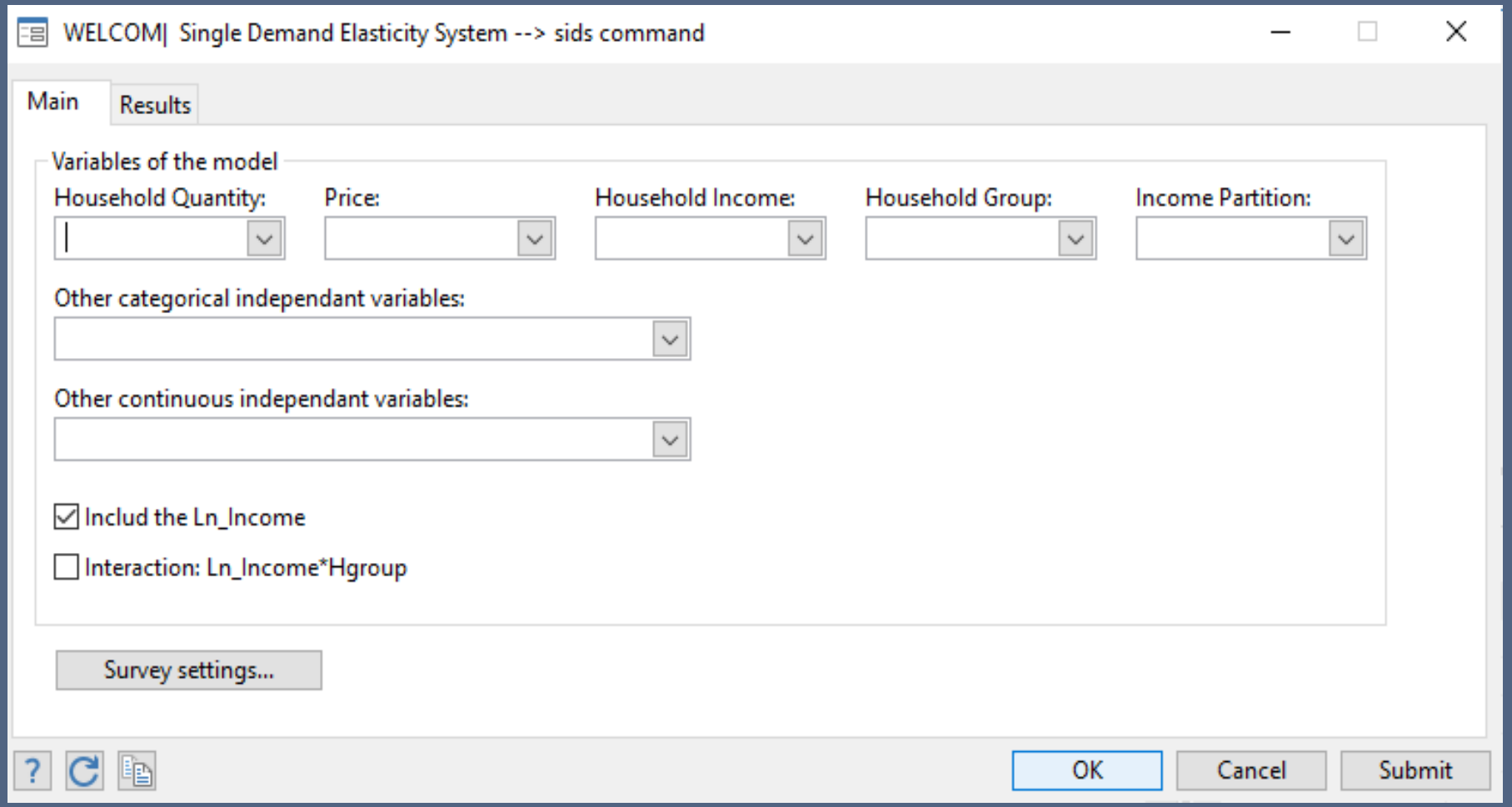
Where varnames stands for: *q*, *p* and *Y* (quantity, price and income respectively).

Users should set their surveys' sampling design before using this module.

help sids

V. The SIDS Stata command

- The open the dialog-box, you can type **`db sids`**



V. The SIDS Stata command

```
. * Example 1: Estimating the cereal elasticities in Mexico by quintile
. #delimit ;
delimiter now ;
. use http://dasp.ecn.ulaval.ca/welcom/examples/ds/Mexico_2014_Cereals.dta , replace;

.  sids hh_q_corn pcorn hh_current_inc, hgroup(quintile) indcon(age) ;
```

	(Model 01)	(Model 03)
LnPrice	-0.7685***	
LnHH_Inc	0.1245***	0.5406***
Age of head of household	0.0011	0.0044***
LnPrice_quintile_1		-0.5709***
LnPrice_quintile_2		-0.5038***
LnPrice_quintile_3		-0.5638***
LnPrice_quintile_4		-0.6763***
LnPrice_quintile_5		-0.9807***
Constant	3.0953***	-1.1193***
Observations	15375	15375
R-squared	0.094	0.216

* p<0.05, ** p<0.01, *** p<0.001

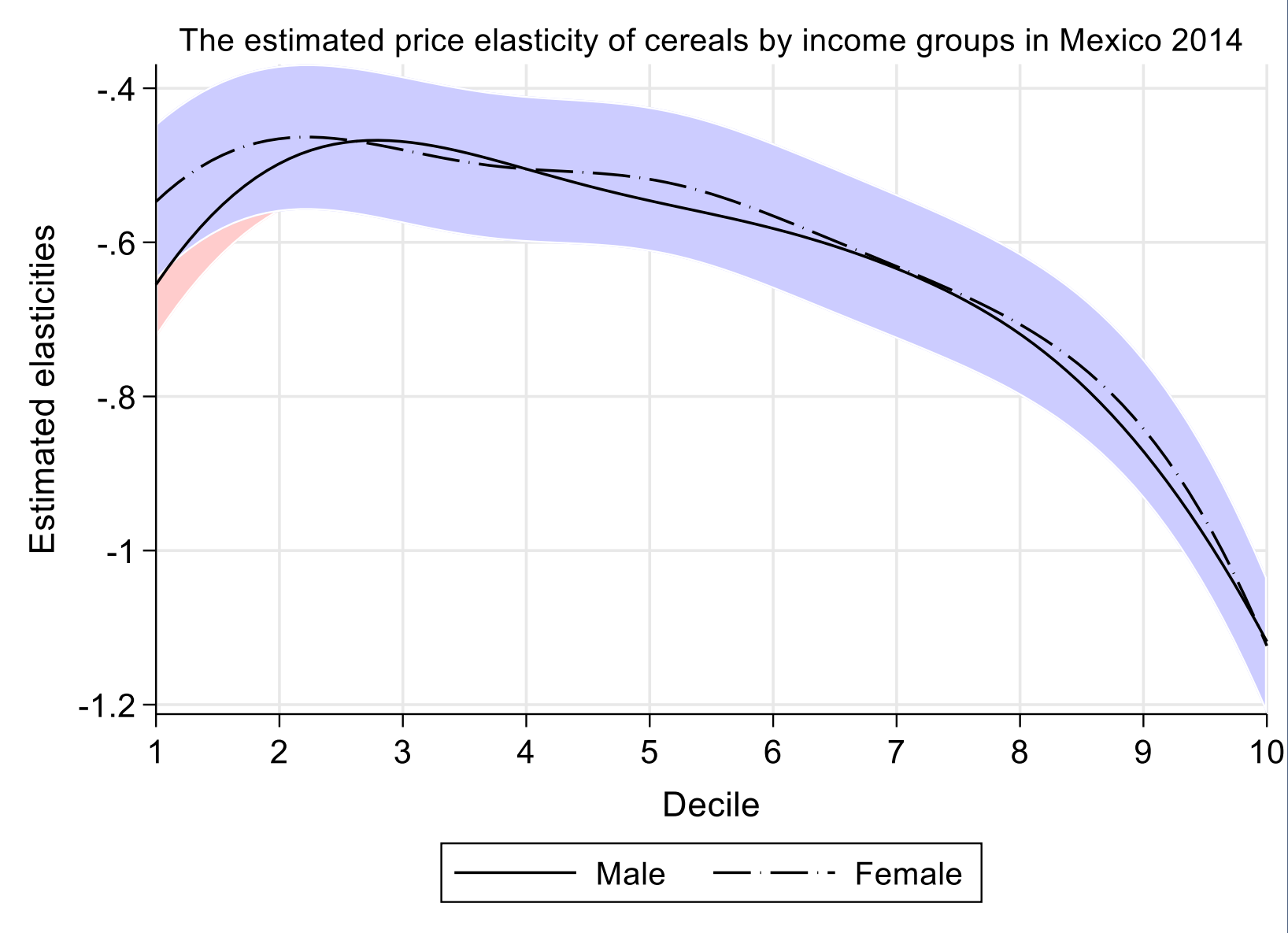
V. The SIDS
Stata command

*Example 2: Estimating the cereal elasticities and the standard errors (with the bootstrap approach)

svyset _n [pweight=factor], vce(linearized) singleunit(missing)

```
#delimit ;
use http://dasp.ecn.ulaval.ca/welcom/examples/ds/Mexico_2014_Cereals.dta , replace;
sids hh_q_corn pcorn hh_current_inc, hgroup(sex) incpar(decile) indcon(age) incint(1) xfil(myres) dgra(1)
ti("") subtitle("The estimated price elasticity of cereals by income
```

V. The SIDS Stata command



V. The SIDS
Stata command

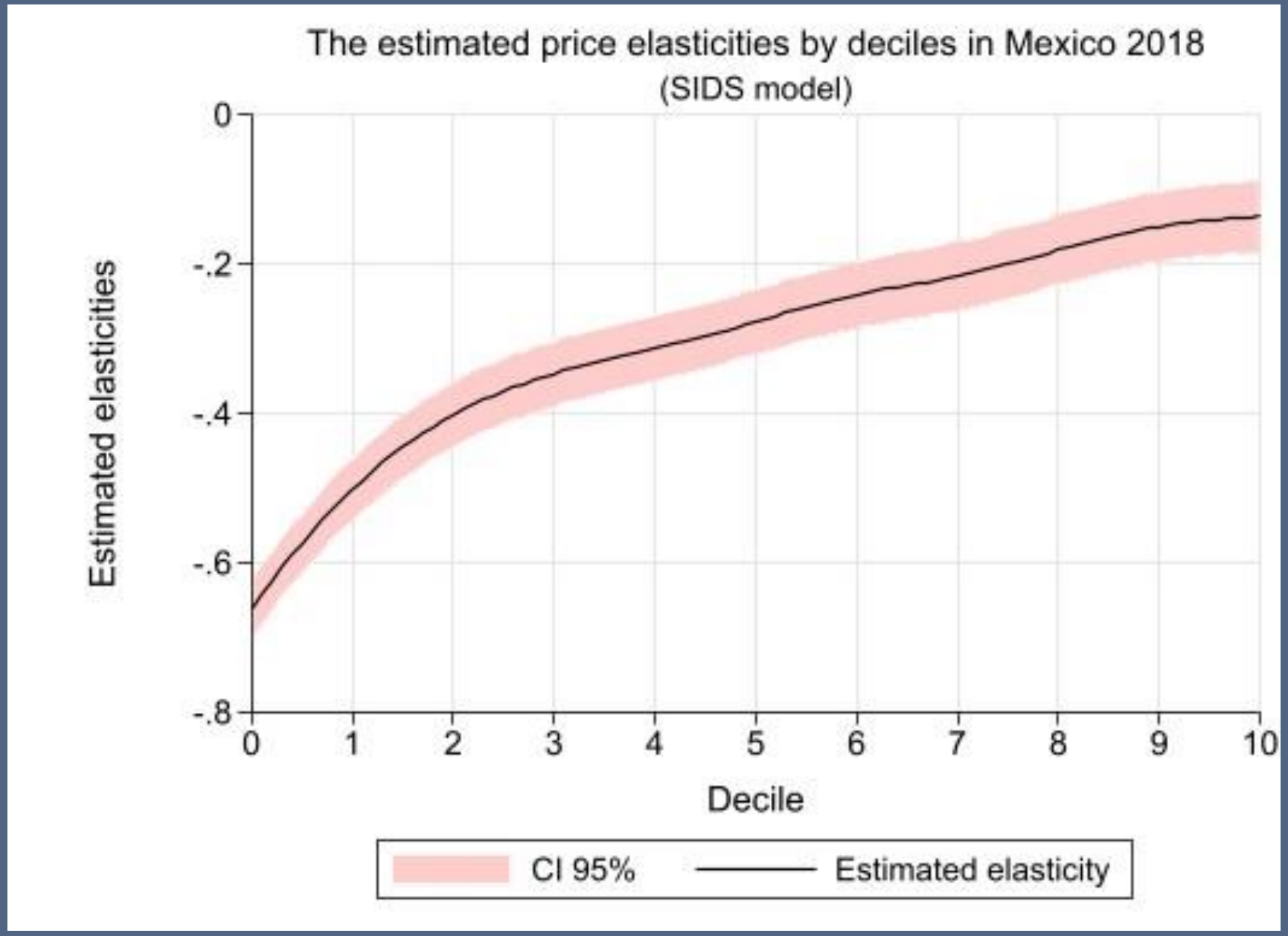
```
*Example 3: Estimating the tobacco elasticities and the standard errors by income groups

svyset _n [pweight=factor], vce(linearized) singleunit(missing)
#delimit;
preserve
sids hhQt nprice hhInc , incpar(decil) indcat(educa_hhh rururb alcohol )
      indcon(lnhhInc ind_1 edad_jefe edad_jefe2 hombres lambda ) dregres(0) dgra(1)
     title("The estimated price elasticity by deciles in Mexico 2018", size(medium))
     subtitle("SIDS model", size(medsmall))
restore ;
```

```
. sids hhQt nprice hhInc , incpar(decil) indcat(educa_hhh rururb alcohol )  ///
>        indcon(hhInc ind_1 edad_jefe edad_jefe2 hombres lambda ) dregres(0) dgra(1)
```

	(Model 01)	(Model 02)
LnPrice	-0.4248***	
LnHH_Inc	0.4069***	0.2810***
Without Instruction	0.1979***	0.2109***
Primary Level	0.1879***	0.1972***
Secondary Level	0.1285***	0.1355***
Terciary Level	0.0000	0.0000
Urbano	-0.0206	-0.0228*
Rural	0.0000	0.0000
No Alcohol Expenditure	-0.3766***	-0.3787***
Alcohol Expenditure	0.0000	0.0000
Income	0.0000	0.0000
Ind_Quality	-0.5489***	-0.5668***
Age of the head of the household	0.0043	0.0039
Squared Age of HHH	-0.0001**	-0.0001**
Household members men	0.3201***	0.3189***
lambda	0.5011***	0.5260***
LnPrice_Decile_01		-0.5275***
LnPrice_Decile_02		-0.4820***
LnPrice_Decile_03		-0.4660***
LnPrice_Decile_04		-0.4563***
LnPrice_Decile_05		-0.4439***
LnPrice_Decile_06		-0.4100***
LnPrice_Decile_07		-0.4184***
LnPrice_Decile_08		-0.3765***
LnPrice_Decile_09		-0.3605***
LnPrice_Decile_10		-0.3372***
Constant	-4.0551***	-2.6225***
Observations	70311	70311
R-squared	0.187	0.189

* p<0.05, ** p<0.01, *** p<0.001

Graph of tobacco elasticities by deciles of per capita income and ci.

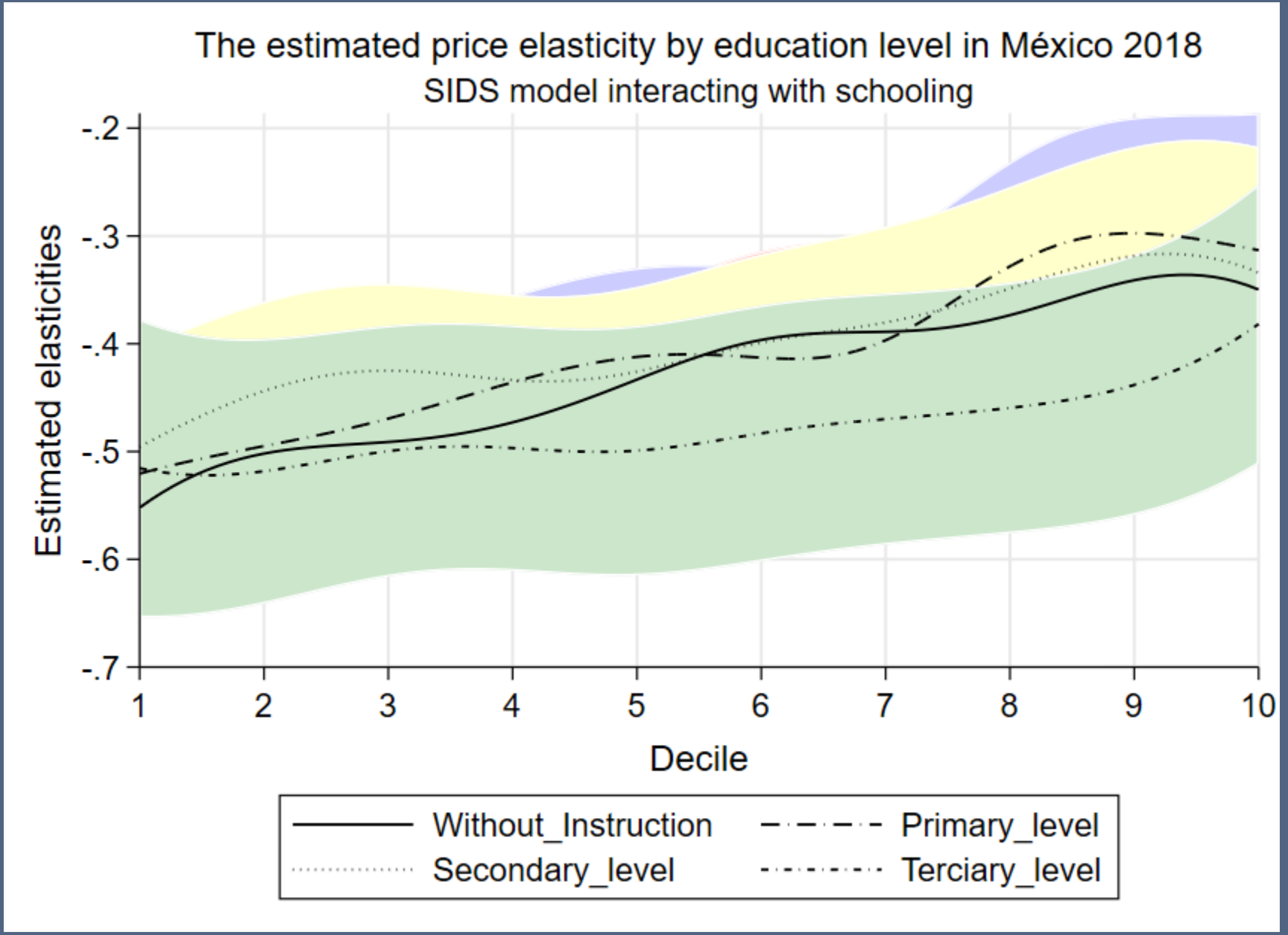


V. The SIDS
Stata command

*Example 4: Estimating the tobacco elasticities and the standard errors by income groups and interaction with schooling levels : Click below in the syntax to open do

```
. #delimit ;
delimiter now ;
. sids   hhQt nprice hhInc , incpar(decil)  hgroup(educa_hhh)
> indcat(sexo_jefe educa_hhh rururb alcohol ) indcon( hhInc ind_1 edad_jefe edad_jefe2 hombres lambda )
>  dregres(0)  dgra(1) sgra(results\graphs\Graph_Socio_Elas) xfil(`xfil')
> title(The estimated price elasticity by education level in México 2018, size(medium))
> subtitle("SIDS model interacting with schooling", size(medsmall))
> ;
```

Graph of tobacco elasticities by deciles and schooling with ci.



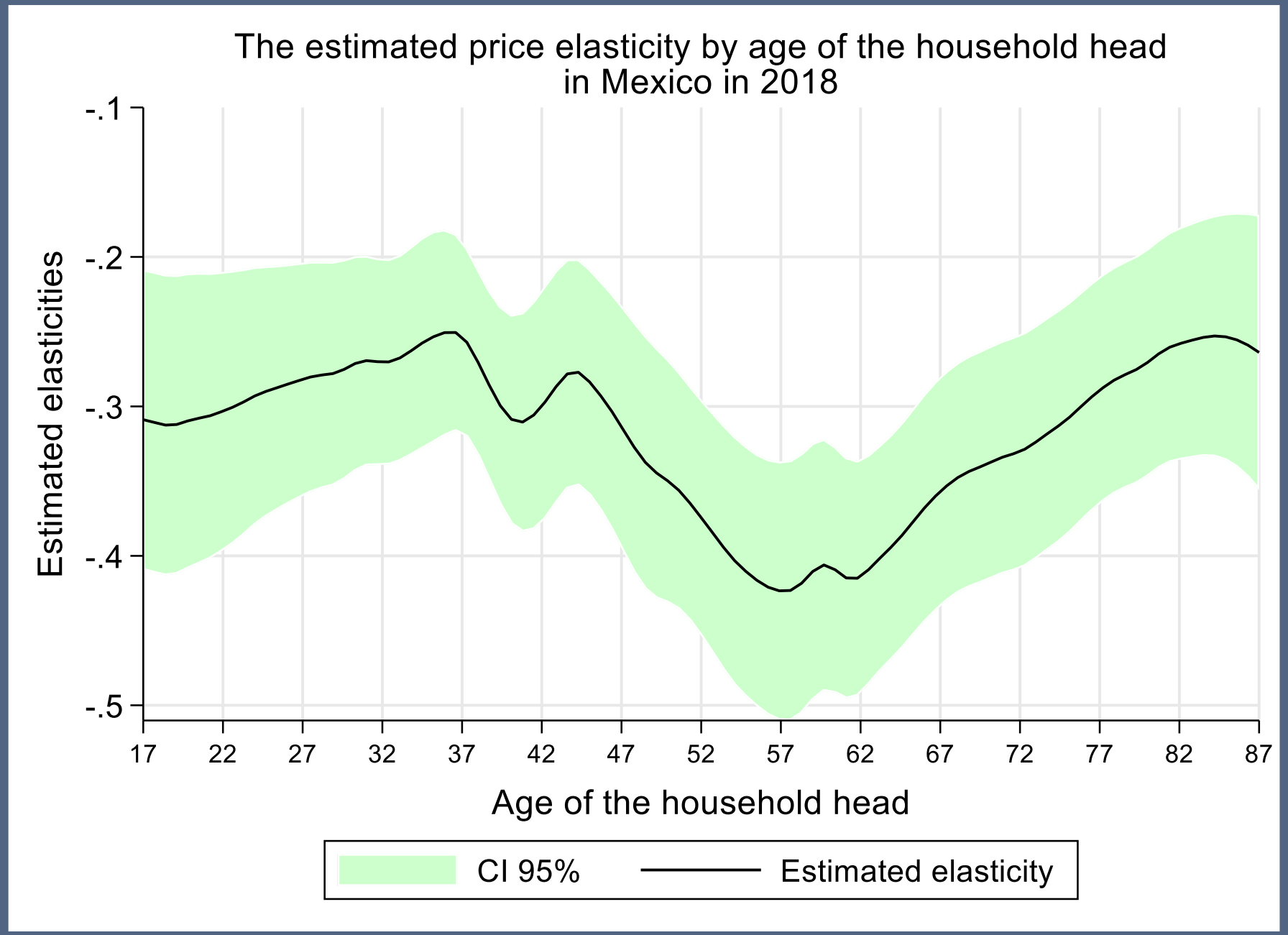
*Example 5: Estimating the tobacco elasticities and the standard errors and ci by income groups and forvalues in age as `i=17/85` according to its cdf in the survey :

```
restore
log close*/
* To graph by age levels
preserve
cdf edad_jefe, min(0) max(100) sres(temp) lres(1) dgra(0)
merge 1:1 _n using "temp.dta"
drop _merge
gen myage = 0
gen elas = .
gen ub = .
gen lb = .
local pos = 1
forvalues i=17/85 {
local p = _cory[`i']
qui gepwe edad_jefe [aw=factor], per1(`p')
qui svyset _n [pweight=_pcw], vce(linearized) singleunit(missing)
qui sids Qt nprice Inc,  indcat(sexo_jefe   educa_hhh  ) indcon(  ind_1 edad_jefe edad_jefe2 hombres lambda )
dis "Age : `i'"
qui replace myage = `i'-1   in `pos'
qui replace elas  = r(est)  in `pos'
qui replace lb    = r(est) - 1.96*r(se) in `pos'
qui replace ub    = r(est) + 1.96*r(se) in `pos'
local pos = `pos'+1
}
```

*Example 5: Estimating the tobacco elasticities and the standard errors and ci by income groups and forvalues in age as `i=17/85` according to its cdf in the survey :

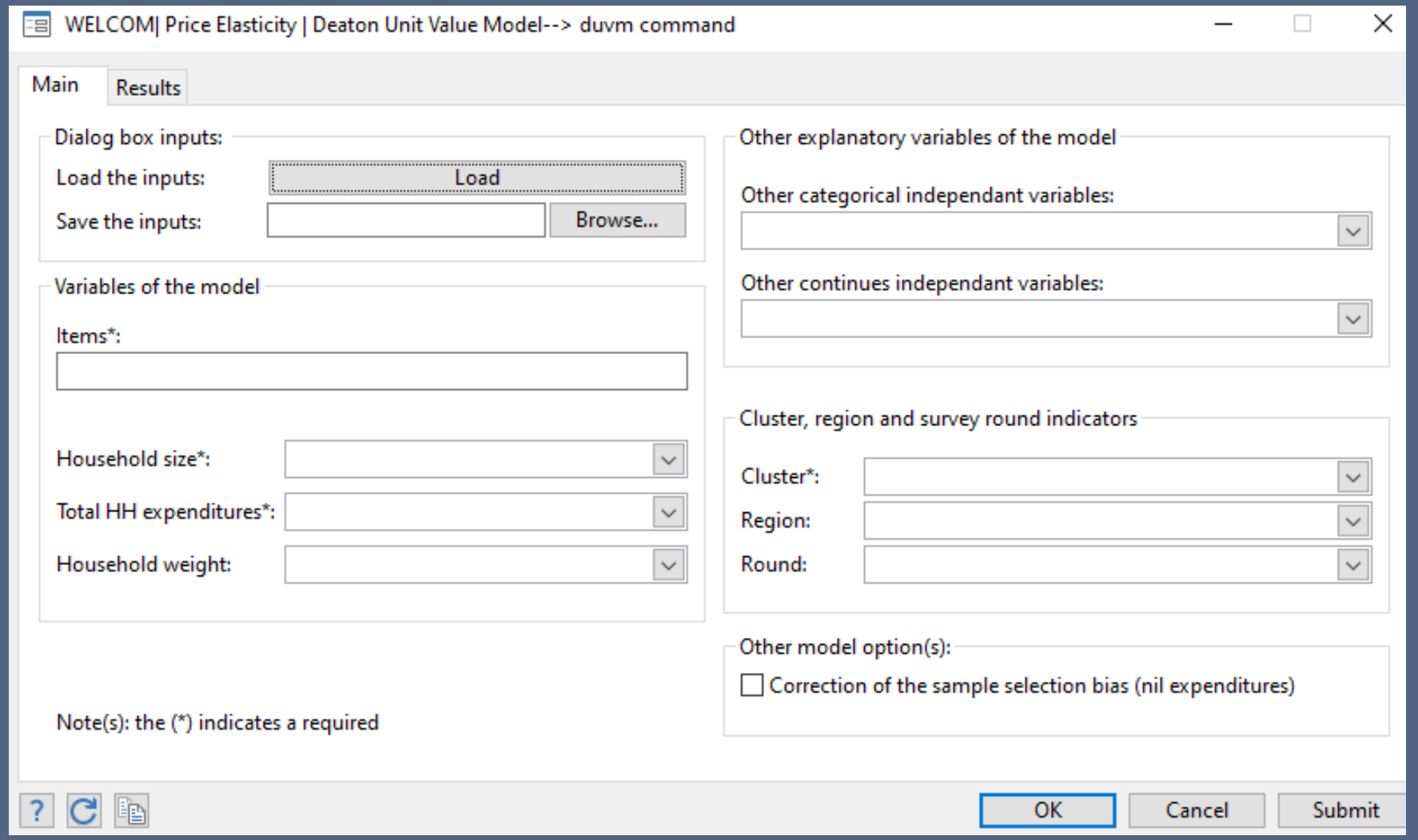
```
77
78  qui svyset _n , vce(linearized) singleunit(missing)
79
80  #delimit ;
81  cmnpe bb,  min(17) max(87) band(1.0) color1(lime)
82  title("The estimated price elasticity by age of the household head")
83  subtitle("")
84  xtitle("Age of the household head")
85  ytitle("Estimated elasticities")
86  lab1("Estimated elasticity")
87  xscale(range(17 87)) xlabel(17(5)87, labsize(small), , grid gmin gmax gextend)
88
89  ;
```

Graph of tobacco elasticities by deciles and continuous age with ci.



V. The DUVM Stata command

- The open the dialog-box, you can type **`db duvm`**



V. The DUVM Stata command

The basic syntax of the DUVM module is as follows:

```
duvm namelist , [options]
```

namelist should contain the names of items of expenditures.

- the data must contain two variables for each item in the **namelist**. The name of the first variable is composed of the letter **w** followed by the name of the item. The name of second variable is composed of the word **luv** and the name of the item.
- For instance, if the name is cigarettes of the item *tobacco*, we must have the two variables: *wcig* and *luvcig*, which refers to the expenditure share and the log of the unit value of the tobacco item respectively.
- The options of the **duvm** command are (required in bold) in next slide

V. The DUVM Stata command

duvm namelist (min=2), [expend(varname) hhsize(varname)
hgroup(varname) indcat(varlist) indcon(varlist) cluster(varname)
hweight(varname) region(varname) subround(varname) cbs(string)
boot(int) xfil(string) dec(int) snames(string) dregres(string)]

The **cluster** option is required in an intermediate step to estimate the derivative of the log(exp_share) with regards to the log(unit value).

```
help duvm
```

VI. Example of duvm module with matching data

The data

We use the National Survey of Household Income and Expenditure (ENIGH) of Mexico, which provides information on the tobacco purchases, sugary drinks, and alcohol consumed and each unit values.

Because the ENIGH does not include information on consumer health to conduct analysis of subgroups by health condition (i.e. obesity, diabetes and hypertension) database is merged with the National Health and Nutrition Survey (ENSANUT) for the same year, 2018.

- It employs two-stage cluster probability sampling based on primary sampling units (PSUs).
- Stratification of the surveys also takes into account the size of localities (urban or rural).
- Both surveys are nationally representative.
- The target population considered in the analysis is individuals aged 12 and older, with a total of 212,394 observations.

Matching of ENIGH and ENSANUT databases

- ENIGH aims to capture the different sources of income available to households and their members and expenditure patterns.
- ENSANUT is designed to describe the health of the national population and understand firsthand the comorbidities and NCDs among the population.
- The two databases are fused together with the probability matching technique by using a matching approach under predefined groupings (Rios-Avila, 2018).
- The nearest neighbor method and Stata's psmatch2 code are used, ensuring the most similar clusters in both databases (see Becker & Ichino (2002)).

Matching of ENIGH and ENSANUT databases

- One key variable in achieving better propensity score matching between the two surveys is the income group.
- Similar groups are formed based on tobacco expenditure, alcohol expenditure, and residents' income subdivided by tertiles.
- These three variables are available in ENIGH and ENSANUT data, ensuring these three categories and producing 3 x 3 x 3 = 27 groups (i.e. tobacco consumers, the alcohol consumers, and soft drink consumers).
- The matching exercise is fulfilled by using a probit regression to the variables contained in both surveys: stratum, gender, age; urban/rural locality, state of residence, marital status, speak a native language, if attending school, utilities.

Matching of ENIGH and ENSANUT databases

```
261
262  /* The fgr_data is the pooled data (ensanut + enigh) */
263  use fgr_data, replace
264  *tab fgr
265  forvalues i=1/15 {
266  preserve
267  keep if fgr==`i'
268  count
269  dis `i'
270
271  quietly xi: psmatch2 data  i.estrato edad   i.sexo  i.urbano  i.parentesco hablaind asis_esc   eli_basura  tenencia tinaco_azo cisterna ///
272  medidor_luz aire_acond automovil camioneta motocicleta tv_paga computadora  licuadora refrigerador estufa lavadora ///
273  , n(1) logit  pw(factor)
274
275  local r2p_`i' = e(r2_p)
276  /*psgraph  , treated(data ) pscore( _pscore )*/
277  save tmp , replace
278  keep if data == 1
279  save fgr_data_ensa_`i', replace
280  use  tmp , replace
281  keep if data == 0
282  foreach var of varlist _all {
283      cap rename `var' eni_`var'
284  }
285  rename eni__id _n1
286  save fgr_data_enig_`i', replace
287
288  use  fgr_data_ensa_`i', replace
289  merge m:1 _n1 using "fgr_data_enig_`i'.dta"
290  keep if _merge == 3
291  foreach var of varlist _all {
292      local type = substr("`: type `var''", 1, 3)
293      if "`type'" != "str" {
294          qui count if `var'!=.
295      if `r(N)' ==0 qui drop `var'
296      }
297      //cap destring `var', replace
298
299
300  }
301  count
302  if `r(N)' > 0 save com_fgr_`i' , replace
303  restore
304  }
```

duvm Stata command and application

Example using duvm command to obtain tobacco, alcohol and soft-drinks own and cross-price elasticities.

help duvm and match

Empirical application

Database

duvm example with own and cross tobacco, alcohol and sugary drinks price elasticities (The whole population & ENIGH only)

```
. duvm tab alc sdb, hhsize(tot_integ) expend(ing_cor)  cluster(ubica_geo) ///
 inisave(est1_duvm_db) indcat(estrato  urbano est_socio  clase_hog sexo  edo_conyug nivelaprob  )  ///
 indcon(edad) dregres(1) csb(1)
```

Table 06: Price elasticities: with quality correction | without symmetry restricted estimators

	tab	alc	sdb
tab	-0.818	0.005	1.320
alc	-0.099	-0.627	0.802
sdb	-0.103	-0.037	-0.394

click here to open with Excel

Table 07: Price elasticities: with quality correction | with symmetry restricted estimators

	tab	alc	sdb
tab	-0.757	-0.036	-0.809
alc	-0.022	-0.599	-0.109
sdb	-0.081	-0.017	-0.404

click here to open with Excel

duvm example with own and cross tobacco, alcohol and sugary drinks price elasticities (Tobacco consumers & ENIGH only)

```
. preserve
. keep if mark_tab ==1
. duvm tab alc sdb, hhsize(tot_integ) expend(ing_cor)  cluster(ubica_geo) inisave(est1_duvm_db) ///
                indcat(estrato  urbano est_socio  clase_hog sexo  edo_conyug nivelaprob  )   ///
                indcon(edad) dregres(1) csb(1)
. restore
```

Table 06: Price elasticities: with quality correction | without symmetry restricted estimators

	tab	alc	sdb
tab	-0.689	-0.045	0.317
alc	-0.113	-0.831	0.800
sdb	-0.173	-0.096	-0.472

click here to open with Excel

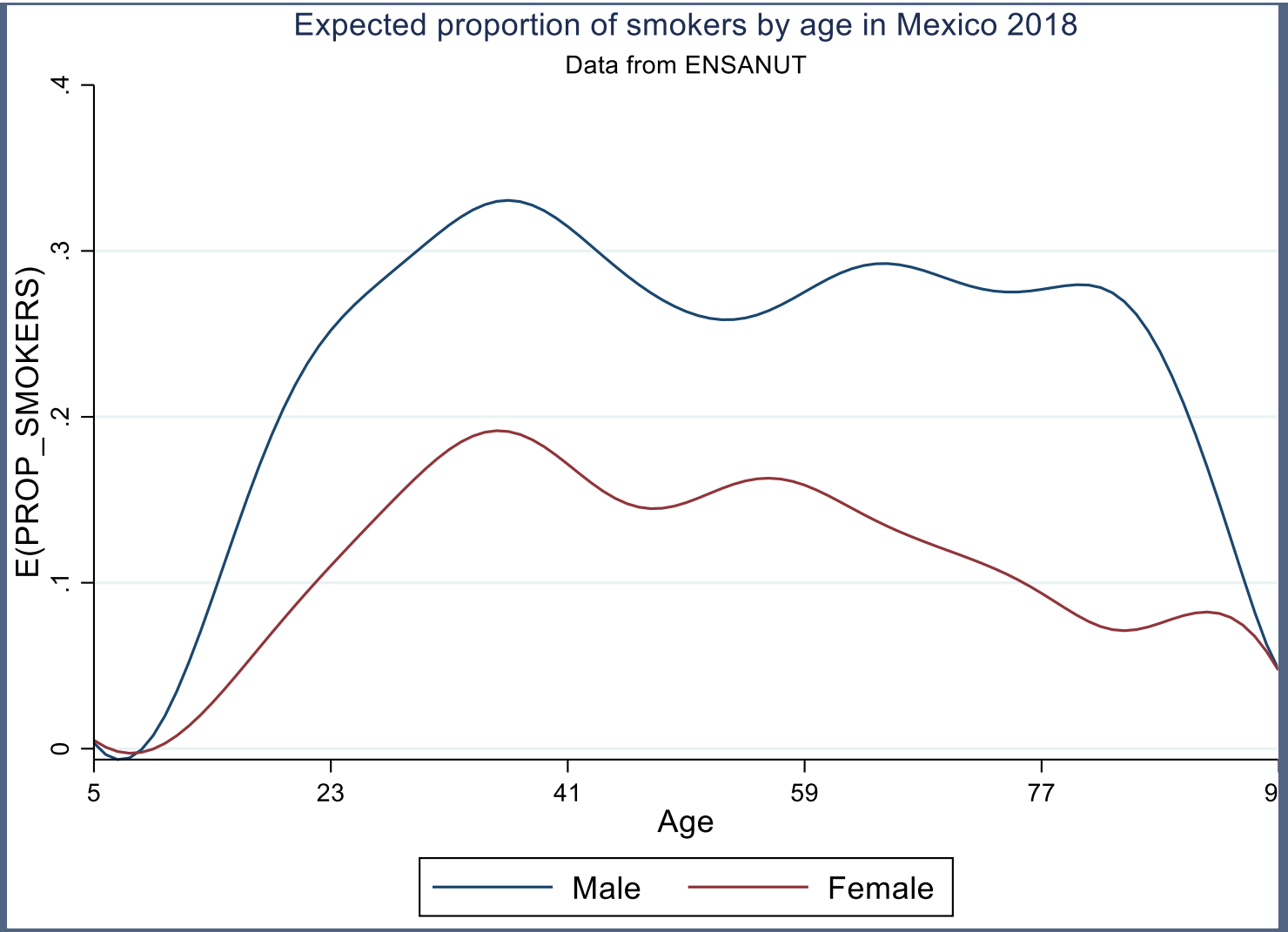
Table 07: Price elasticities: with quality correction | with symmetry restricted estimators

	tab	alc	sdb
tab	-0.681	-0.018	-0.026
alc	-0.138	-0.771	-0.192
sdb	-0.054	-0.048	-0.502

click here to open with Excel

Before we apply duvm command let's take a look at the data by using non-parametric regression (the whole population with ENIGH-ENSANUT)

```
. cnpe smok, xvar(edad) hgroup(gender) min(5) max(95) band(6) ytitle(E(PROP_SMOKERS)) xtitle(Age)  ///
      title(Expected proportion of smokers by age in Mexico 2018, size(medsmall)) subtitle("Data from ENSANUT") ///
      legend(order(1 "Male" 2 "Female")) graphregion(margin(zero) fcolor(white) lcolor(white)ifcolor(white) ilcolor(white)) ///
      plotregion(margin(zero))
```



To have an idea of the non-nil consumptions (The whole population with ENIGH-ENSANUT)

```
. /* To have an idea on non nil consumptions */
. local mylist tab alc sdb

. foreach var of local mylist {
  2. qui gen mark_`var' = (q_`var' != 0)
  3. }

.
. total mark_*

Total estimation                          Number of obs = 13,703
```

	Total	Std. err.	[95% conf.	interval]
mark_tab	2594	45.85962	2504.109	2683.891
mark_alc	2871	47.64079	2777.618	2964.382
mark_sdb	4477	54.90454	4369.38	4584.62

Replace unit values at PSU level (The whole population with ENIGH-ENSANUT)

```
. /*
> Consumers with nul expenditures will have missing unit values.
> To overcome this, we replace the missing values by the average of unit values at PSU level (8395 upm).
> If some missings remain, we use the average at the level of the geographical unit level (996 ubica_geo).
> If some missings remain, we use the average at the level of the entity unit (32 ent).
> */
. destring upm, replace
upm already numeric; no replace

. local mylist tab alc sdb

. foreach var of local mylist {
  2. by upm, sort       : egen float m1_`var' = mean(uv`var')
  3. by ubica_geo, sort : egen float m2_`var' = mean(uv`var')
  4. by ent, sort       : egen float m3_`var' = mean(uv`var')
  5. qui replace luv`var' = log(m1_`var') if luv`var' == .
  6. qui replace luv`var' = log(m2_`var') if luv`var' == .
  7. qui replace luv`var' = log(m3_`var') if luv`var' == .
  8. }
(4,367 missing values generated)
(6,727 missing values generated)
(2,884 missing values generated)
```

Means of people suffering one NCDs (The whole population with ENIGH-ENSANUT)

```
. sum obese diabetic  hiperten if mark_tab==1

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
       obese |      2,594    .2856592    .4518149         0          1
    diabetic |      2,594     .079414     .270436         0          1
    hiperten |      2,594    .1391673    .3461878         0          1

. sum obese diabetic  hiperten if mark_alc==1

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
       obese |      2,871     .174852    .3799066         0          1
    diabetic |      2,871    .0518983    .2218603         0          1
    hiperten |      2,871    .0978753    .2971977         0          1

. sum obese diabetic  hiperten if mark_sdb==1

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
       obese |      4,477    .1445164    .3516519         0          1
    diabetic |      4,477    .0451195    .2075894         0          1
    hiperten |      4,477    .0844315     .278065         0          1
```

duvm example with own and cross tobacco, alcohol and sugary drinks price elasticities (Tobacco consumers & ENIGH only)

```
. preserve
. keep if  mark_tab==1 |  mark_alc==1  & eni_edad>=15 & refrescos!=0
. duvm tab alc sdb, hhsize(ehsize) expend( avr_ing)  cluster(est_dis) inisave(est1_duvm_db) indcat( estrato  eni_clase_hog  eni_sexo
edo_conyug  nivelaprob  parentesco  ) indcon(eni_edad ) dregres(1) csb(1)
 restore
```

Table 06: Price elasticities: with quality correction | without symmetry restricted estimators

	tab	alc	sdb
tab	-0.595	0.264	0.000
alc	0.364	-0.447	0.000
sdb	0.132	-0.384	-0.998

click here to open with Excel

Table 07: Price elasticities: with quality correction | with symmetry restricted estimators

	tab	alc	sdb
tab	-0.593	0.196	0.000
alc	0.379	-0.452	0.000
sdb	0.006	0.001	-0.998

click here to open with Excel

Some caveats on the results:

The cross elasticities of tobacco with SBD are close to zero. This can be explained for two reasons:

a. The two goods are strongly separable (the change in price of tobacco slowly influences the consumption of SBD);
b. A lot of people have zero or very low expenditures of tobacco. Thus, the change in price of tobacco will have a neglecting effect on consumption of SBD.
c. In the inverse, Tobacco and Alcohol beverages behave the same as complementary goods.

VII. More applications from WELCOM.

There are three more models in the package:

- AIDS & QUAIDS Demand System Models
- Exact Affine Stone Index (EASI)
- See Appendix for results on this presentation:

/* Note that all results are helpful and informative */

/* However, for tobacco reforms, the results AA must be considered in prior.

This is because, in this case, we focus on the smoker group (group of interest which will react to the tobacco tax reforms).