

```

-----
name: <unnamed>
log: F:\Cochrane-C2 10\Stata_Output_MultipleESs.log
log type: text
opened on: 8 Oct 2010, 11:14:09

. /*****
> Example Stata Do-file to Create Dataset
> for Meta-Regression Robust Standard Error Calculations
> in R using the robust.se() function, and
> in Stata using the rmeta ado file
>
> Example 1: Handling Dependencies Due to Multiple
> ESS within a Study
>
> Lipsey, Hedges, Tipton, & Tanner-Smith Workshop
> October, 20th, 2010
> Joint Cochrane-Campbell Colloquium
> Keystone, CO
> *****/

. /***** All Users Must Specify their Working Directory in the File Handle
Below *****/
. cd "F:\Cochrane-C2 10"
F:\Cochrane-C2 10

. use "crExampleData.dta", clear

. des

Contains data from crExampleData.dta
obs: 438
vars: 14 7 Oct 2010 15:59
size: 28,032 (99.9% of memory free)

-----
variable name storage type display format value label variable label
-----
esid double %10.0g Effect Size ID
intercept float %9.0g Intercept
meanvar float %9.0g Average variance of ES within
Study
weights float %9.0g 1/k*meanvar
effectsize float %9.0g Standardized mean difference ES
vareffsize float %9.0g Variance of ES
s float %9.0g sqrt(vareffsize)
alc float %9.0g Alcohol Outcome
dvdays float %9.0g Outcome Timeframe in Days
sreport float %9.0g Self-reported Outcome
permale float %9.0g Percent Male in Tx Group
age float %9.0g Average Age in Tx Group
study float %9.0g Study ID

```

k float %9.0g Number of ESs per Study

Sorted by: study

. sum

Variable	Obs	Mean	Std. Dev.	Min	Max
esid	438	2712.543	1447.721	1	5543
intercept	438	1	0	1	1
meanvar	438	.0636577	.0451867	.00941	.223137
weights	438	4.714372	6.290357	.251663	50.35829
effectsize	438	.1090426	.4776339	-3.884066	1.625731
vareffsize	438	.0639952	.0488053	.0078622	.3679033
s	438	.2368691	.0889173	.0886688	.6065503
alc	438	.3972603	.4898903	0	1
dvdays	438	108.0091	118.352	7	549
sreport	438	.7968037	.4028375	0	1
permale	438	66.35479	17.81208	0	100
age	438	16.88128	1.623957	14	20
study	438	60.31279	29.69903	1	109
k	438	6.063927	3.391405	1	14

.
. /***** Step 1: Create study-mean and study-mean-centered variables for all variables that vary within study *****/

. findit CENTER

```
. foreach var of varlist alc dvdays sreport {
2.     bysort study: egen m_`var' = mean(`var')
3.     bysort study: center `var'
4. }
```

. drop alc-sreport

. /***** Step 2: Order variables in desired order for input into R function for robust standard errors *****/

. order esid study intercept k meanv weights effectsize vareffsize s m_alc - c_sreport permale age

. /***** Step 3: Always sort data by unique identifiers to ensure reproducibility *****/

. sort study esid

. /***** Step 4: Save data files to read into R *****/

. /***** Option 1 is to save one data file and use subset statements when reading data into R *****/

. /***** Note that you can save as a Stata dataset (.dta) or a CSV raw dataset (.out) *****/

```

. save "SingleDataset.dta", replace
file SingleDataset.dta saved

. outsheet using "SingleDataset", comma nolabel replace

.
. /*****Option 2 is to save two separate data files (Data and Design) to read
into R *****/
. sort study esid

. drop esid intercept m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport permale
age

. outsheet using "Data", comma nolabel replace

.
. use "SingleDataset.dta", clear

. sort study esid

. drop esid k meanvar weights effectsize vareffsize s

. outsheet using "Design", comma nolabel replace

.
. /***** Switch to R to use robust.se() function *****/
.
. /***** Now use rmeta ado file to calculate robust standard errors within
Stata *****/
. use "SingleDataset.dta", clear

. program drop _all

. run "rmeta.ado"

. rmeta effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport,
study(study) variance(vareffsize) weighttype(random
> ) small rho(.8)
this routine needs to be verified, do not use for research purposes
beta version 0.5

```

Robust standard error estimation using random model weights

Note: Standard errors and d.f. adjusted for small sample

```

N Level 1 = 438
N Level 2 = 109
Average = 4.02
T-Test DF = 102
Assumed rho = 0.80
tau-squared = 0.1515

```

effectsize	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
m_alc	.125701	.0816575	1.54	0.127	-.0362663	.2876683
c_alc	-.0356596	.0870215	-0.41	0.683	-.2082664	.1369472

m_dvdays	-.000095	.0004787	-0.20	0.843	-.0010446	.0008545
c_dvdays	.0006208	.0003343	1.86	0.066	-.0000423	.001284
m_sreport	-.0955792	.137467	-0.70	0.488	-.3682444	.1770861
c_sreport	.2360773	.1095829	2.15	0.034	.0187202	.4534345
_cons	.1853784	.131166	1.41	0.161	-.0747887	.4455454

this routine needs to be verified, do not use for research purposes

```
. rmeta effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport permale
age, study(study) variance(vareffsize) weigh
> ttype(random) small rho(.8)
this routine needs to be verified, do not use for research purposes
beta version 0.5
```

Robust standard error estimation using random model weights
Note: Standard errors and d.f. adjusted for small sample

N Level 1	=	438
N Level 2	=	109
Average	=	4.02
T-Test DF	=	100
Assumed rho	=	0.80
tau-squared	=	0.1552

effectsize	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
m_alc	.179845	.1449005	1.24	0.217	-.1076336	.4673235
c_alc	-.0357155	.0878524	-0.41	0.685	-.2100121	.1385812
m_dvdays	-.0001103	.0004937	-0.22	0.824	-.0010899	.0008692
c_dvdays	.0006207	.0003382	1.84	0.069	-.0000502	.0012917
m_sreport	-.0990401	.1350522	-0.73	0.465	-.3669797	.1688996
c_sreport	.2362874	.1107345	2.13	0.035	.0165933	.4559814
permale	.0008576	.0030592	0.28	0.780	-.0052118	.006927
age	-.011984	.0341045	-0.35	0.726	-.0796464	.0556783
_cons	.3145104	.6091777	0.52	0.607	-.8940809	1.523102

this routine needs to be verified, do not use for research purposes

```
.
. /***** Compare to naive standard errors calculated in Stata's metareg; note
mm option specified *****/
. findit metareg

. metareg effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport, wsse(s)
mm z
```

Meta-regression	Number of obs	=	438
Method of moments estimate of between-study variance	tau2	=	.09604
% residual variation due to heterogeneity	I-squared_res	=	72.62%
Proportion of between-study variance explained	Adj R-squared	=	3.92%
Joint test for all covariates	Model chi2(6)	=	19.60
Without Knapp-Hartung modification	Prob > chi2	=	0.0033

effectsize	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
------------	-------	-----------	---	------	----------------------	--

m_alc	.1066287	.0503419	2.12	0.034	.0079604	.2052969
c_alc	-.0989194	.0767369	-1.29	0.197	-.2493209	.0514821
m_dvdays	-2.94e-06	.0002177	-0.01	0.989	-.0004296	.0004238
c_dvdays	.0005589	.0003157	1.77	0.077	-.0000598	.0011776
m_sreport	.0527563	.0752744	0.70	0.483	-.0947788	.2002915
c_sreport	.2302625	.0802424	2.87	0.004	.0729902	.3875348
_cons	.0196611	.07648	0.26	0.797	-.1302369	.1695591

 . metareg effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport permale
 age, wsse(s) mm z

Meta-regression
 Method of moments estimate of between-study variance tau2 = .09669
 % residual variation due to heterogeneity I-squared_res = 72.75%
 Proportion of between-study variance explained Adj R-squared = 3.28%
 Joint test for all covariates Model chi2(8) = 20.36
 Without Knapp-Hartung modification Prob > chi2 = 0.0091

effectsize	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
m_alc	.0909582	.0774821	1.17	0.240	-.0609039 .2428203
c_alc	-.0988043	.0768984	-1.28	0.199	-.2495225 .0519139
m_dvdays	-5.50e-06	.0002222	-0.02	0.980	-.000441 .00043
c_dvdays	.0005581	.0003165	1.76	0.078	-.0000622 .0011784
m_sreport	.0529814	.0754766	0.70	0.483	-.09495 .2009128
c_sreport	.2303305	.0804301	2.86	0.004	.0726904 .3879706
permale	-.0013633	.0019142	-0.71	0.476	-.0051151 .0023885
age	-.0134723	.0167535	-0.80	0.421	-.0463085 .0193639
_cons	.3435712	.3660589	0.94	0.348	-.373891 1.061033

 . /***** Compare to naive results using study level mean effect sizes only
 *****/

```
. use "crExampleData.dta", clear

. foreach var of varlist effectsize s_alc dvdays sreport {
    2.     bysort study: egen mean`var' = mean(`var')
    3. }
```

. duplicates drop study meaneffectsize, force

Duplicates in terms of study meaneffectsize

(329 observations deleted)

. metareg meaneffectsize meanalc meandvdays meansreport, wsse(means) mm z

Meta-regression
 Method of moments estimate of between-study variance tau2 = .1101
 % residual variation due to heterogeneity I-squared_res = 72.45%
 Proportion of between-study variance explained Adj R-squared = -2.40%
 Joint test for all covariates Model chi2(3) = 1.79

Without Knapp-Hartung modification Prob > chi2 = 0.6165

meaneffect~e	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
meanalc	.1247394	.0995786	1.25	0.210	-.0704311	.3199099
meandvdays	-.0001202	.0004453	-0.27	0.787	-.000993	.0007526
meansreport	-.1024018	.1405149	-0.73	0.466	-.3778059	.1730022
_cons	.190883	.1454662	1.31	0.189	-.0942254	.4759914

. metareg meaneffectsize meanalc meandvdays meansreport permale age,
wsse(means) mm z

Meta-regression Number of obs = 109
Method of moments estimate of between-study variance tau2 = .1129
% residual variation due to heterogeneity I-squared_res = 72.88%
Proportion of between-study variance explained Adj R-squared = -5.02%
Joint test for all covariates Model chi2(5) = 1.92
Without Knapp-Hartung modification Prob > chi2 = 0.8606

meaneffect~e	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
meanalc	.1678567	.1480935	1.13	0.257	-.1224012	.4581146
meandvdays	-.0001311	.0004508	-0.29	0.771	-.0010146	.0007525
meansreport	-.1052381	.1426747	-0.74	0.461	-.3848753	.1743991
permale	.0007426	.0030255	0.25	0.806	-.0051872	.0066725
age	-.0086702	.0342016	-0.25	0.800	-.075704	.0583637
_cons	.2752032	.6480605	0.42	0.671	-.994972	1.545378

. outsheet using "NeverUseThisModel.out", comma nolabel replace

. log close
name: <unnamed>
log: C:\Users\tanneree\Documents\Presentations\Cochrane-C2
10\Stata_Output_MultipleESs.log
log type: text
closed on: 8 Oct 2010, 11:14:12

name: <unnamed>
log: F:\Cochrane-C2 10\Stata_Output_MultipleLabs.log
log type: text
opened on: 8 Oct 2010, 11:14:12

. /*****
> Example Stata Do-file to Create Dataset

```
> for Meta-Regression Robust Standard Error Calculations
> in R using the robust.hier.se() function, and
> in Stata using the rmeta ado file
>
```

```
> Example 2: Handling Dependencies Due to Multiple
> Studies within Labs/Research Groups
>
```

```
> Lipsey, Hedges, Tipton, & Tanner-Smith Workshop
> October, 20th, 2010
> Joint Cochrane-Campbell Colloquium
> Keystone, CO
```

```
> *****/
```

```
. cd "F:\Cochrane-C2 10"
```

```
F:\Cochrane-C2 10
```

```
. use "crHierExampleData.dta", clear
```

```
. des
```

```
Contains data from crHierExampleData.dta
```

```
obs:          68
vars:          13          7 Oct 2010 15:52
size:         4,080 (99.9% of memory free)
```

```
-----
```

variable name	storage type	display format	value label	variable label
esid	double	%10.0g		Effect Size ID
intercept	float	%9.0g		Intercept
study	float	%9.0g		Lab/Research Group ID
k	float	%9.0g		Number of ESs per Lab/Research Group
weights	float	%9.0g		1/vareffsize
effectsize	float	%9.0g		Standardized mean difference ES
vareffsize	float	%9.0g		Variance of ES
s	float	%9.0g		sqrt(vareffsize)
alc	float	%9.0g		Alcohol Outcome
dvdays	float	%9.0g		Outcome Timeframe in Days
sreport	float	%9.0g		Self-reported Outcome
permale	float	%9.0g		Percent Male in Tx Group
age	float	%9.0g		Average Age in Tx Group

```
-----
```

```
Sorted by: study
```

```
. sum
```

Variable	Obs	Mean	Std. Dev.	Min	Max
esid	68	2590.426	1738.876	5	5526
intercept	68	1	0	1	1
study	68	10.04412	5.138191	1	15
k	68	14.52941	12.65321	1	29

weights	68	4.349385	5.314722	.1298805	26.46951
effectsize	68	.2964686	.5843226	-1.651863	1.767375
vareffsize	68	.0804133	.0586264	.0094448	.265496
s	68	.2659872	.0990371	.0971845	.515263
alc	68	.3382353	.4766266	0	1
dvdays	68	98.60294	106.4471	28	549
sreport	68	.6764706	.471301	0	1
permale	68	66.16765	18.79019	0	100
age	68	16.68735	1.421967	14	20

```

.
. /***** Step 1: Create study-mean and study-mean-centered variables for all
variables that vary within study *****/
. findit center

. foreach var of varlist alc dvdays sreport permale age{
2.     bysort study: egen m_`var' = mean(`var')
3.     bysort study: center `var'
4. }

.
. /***** Step 2: Order variables in desired order for input into R function for
robust standard errors *****/
. order esid study intercept k vareffsize weights effectsize s m_alc - c_age

. drop alc-sreport

.
. /***** Step 3: Always sort data by unique identifiers to ensure
reproducibility *****/
. sort study esid

.
. /***** Step 4: Save data files to read into R*****/
. /***** Option 1 is to save one data file and use subsets statements when
reading data into R *****/
. /***** Note that you can save as a Stata dataset (.dta) or a CSV raw dataset
(.out) *****/
. save "HierSingleDataset.dta", replace
file HierSingleDataset.dta saved

. outsheet using "HierSingleDataset", comma nolabel replace

.
. /***** Option 2 is to save two separate data files (data and Xfull) to read
into R *****/
. sort study esid

. drop esid intercept m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport
m_permale c_permale m_age c_age

. outsheet using "HierData", comma nolabel replace

```

```
.
. use "HierSingleDataset.dta", clear

. sort study esid

. drop esid k weights effectsize vareffsize s

. outsheet using "HierDesign", comma nolabel replace

.
. /***** Switch to R to use robust.se() function *****/
.
. /***** Now use rmeta ado file to calculate robust standard errors within
Stata *****/
. use "HierSingleDataset.dta", clear

. program drop _all

. run "rmeta.ado"

. rmeta effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport,
study(study) variance(vareffsize) weighttype(hierar
> chical) small
this routine needs to be verified, do not use for research purposes
beta version 0.5
```

Robust standard error estimation using hierarchical model weights
Note: Standard errors and d.f. adjusted for small sample

```
N Level 1      =      68
N Level 2      =      15
Average        =      4.53
T-Test DF      =       8
tau-squared    =     0.0193
omega-squared  =     0.1174
```

effectsize	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
m_alc	.5652477	.3348075	1.69	0.130	-.2068199	1.337315
c_alc	.4889688	.1107421	4.42	0.002	.2335972	.7443405
m_dvdays	.0019803	.0015114	1.31	0.226	-.0015049	.0054655
c_dvdays	.0007442	.0002456	3.03	0.016	.000178	.0013105
m_sreport	.1658455	.2844133	0.58	0.576	-.4900127	.8217038
c_sreport	.543936	.166073	3.28	0.011	.1609709	.926901
_cons	-.2343301	.2115274	-1.11	0.300	-.7221132	.253453

this routine needs to be verified, do not use for research purposes

```
. rmeta effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport m_permale
c_permale m_age c_age, study(study) varian
> ce(vareffsize) weighttype(hierarchical) small
this routine needs to be verified, do not use for research purposes
beta version 0.5
```

Robust standard error estimation using hierarchical model weights
Note: Standard errors and d.f. adjusted for small sample

N Level 1 = 68
N Level 2 = 15
Average = 4.53
T-Test DF = 4
tau-squared = 0.1488
omega-squared = 0.0452

effectsize	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
m_alc	.6468407	.3294378	1.96	0.121	-.2678254	1.561507
c_alc	.5463378	.1457932	3.75	0.020	.1415508	.9511247
m_dvdays	.001471	.0020724	0.71	0.517	-.004283	.007225
c_dvdays	.0007188	.0003411	2.11	0.103	-.0002282	.0016657
m_sreport	.2671095	.354789	0.75	0.493	-.7179425	1.252162
c_sreport	.5608385	.2510784	2.23	0.089	-.136267	1.257944
m_permale	-.0039267	.0123267	-0.32	0.766	-.0381512	.0302978
c_permale	.0034761	.0059965	0.58	0.593	-.0131728	.020125
m_age	-.1264213	.1079573	-1.17	0.307	-.426159	.1733163
c_age	.0002203	.1118584	0.00	0.999	-.3103483	.310789
_cons	2.096304	2.380894	0.88	0.428	-4.514118	8.706727

this routine needs to be verified, do not use for research purposes

```
.
. /***** Compare to naive standard errors calculated in Stata's metareg; note
mm option specified for method of moments t
> au-squared estimator *****/
. findit metareg
```

```
. metareg effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport, wsse(s)
mm z
```

Meta-regression Number of obs = 68
Method of moments estimate of between-study variance tau2 = .1302
% residual variation due to heterogeneity I-squared_res = 72.83%
Proportion of between-study variance explained Adj R-squared = 37.68%
Joint test for all covariates Model chi2(6) = 46.12
Without Knapp-Hartung modification Prob > chi2 = 0.0000

effectsize	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
m_alc	.5639314	.2843407	1.98	0.047	.0066338	1.121229
c_alc	.4861941	.1585433	3.07	0.002	.175455	.7969332
m_dvdays	.001975	.0013681	1.44	0.149	-.0007065	.0046565
c_dvdays	.000746	.0005574	1.34	0.181	-.0003466	.0018385
m_sreport	.1637282	.3949375	0.41	0.678	-.6103351	.9377915
c_sreport	.5444662	.1437414	3.79	0.000	.2627382	.8261941
_cons	-.2328356	.2571734	-0.91	0.365	-.7368862	.2712151

```
. metareg effectsize m_alc c_alc m_dvdays c_dvdays m_sreport c_sreport
m_permale c_permale m_age c_age, wsse(s) mm z
```

```

Meta-regression                                Number of obs =      68
Method of moments estimate of between-study variance tau2 =      .1162
% residual variation due to heterogeneity        I-squared_res =    70.12%
Proportion of between-study variance explained   Adj R-squared =    44.35%
Joint test for all covariates                   Model chi2(10) =    52.96
Without Knapp-Hartung modification             Prob > chi2 =     0.0000

```

effectsize	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
m_alc	.6503221	.2792443	2.33	0.020	.1030134 1.197631
c_alc	.5299639	.1599606	3.31	0.001	.2164469 .8434809
m_dvdays	.0014192	.0013975	1.02	0.310	-.0013199 .0041582
c_dvdays	.0007558	.0005438	1.39	0.165	-.0003101 .0018216
m_sreport	.2556808	.4074233	0.63	0.530	-.5428541 1.054216
c_sreport	.5642143	.1424443	3.96	0.000	.2850286 .8434
m_permale	-.0031373	.0099784	-0.31	0.753	-.0226945 .01642
c_permale	.0040436	.0033707	1.20	0.230	-.0025629 .0106501
m_age	-.1287894	.0926468	-1.39	0.164	-.3103738 .052795
c_age	.0072739	.0506145	0.14	0.886	-.0919288 .1064766
_cons	2.086329	2.101899	0.99	0.321	-2.033318 6.205977

```

. /***** Compare to naive results using study level mean effect sizes only
*****/

```

```

. use "crExampleHierData.dta", clear

```

```

. foreach var of varlist effectsize s alc dvdays sreport permale age {
2.     bysort study: egen mean`var' = mean(`var')
3. }

```

```

. duplicates drop study meaneffectsize, force

```

Duplicates in terms of study meaneffectsize

(53 observations deleted)

```

. metareg meaneffectsize meanalc meandvdays meansreport, wsse(means) mm z

```

```

Meta-regression                                Number of obs =      15
Method of moments estimate of between-study variance tau2 =      0
% residual variation due to heterogeneity        I-squared_res =     0.00%
Proportion of between-study variance explained   Adj R-squared =    100.00%
Joint test for all covariates                   Model chi2(3) =    16.37
Without Knapp-Hartung modification             Prob > chi2 =     0.0010

```

meaneffect~e	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
meanalc	.5971717	.2586412	2.31	0.021	.0902443 1.104099
meandvdays	.0012574	.0012244	1.03	0.304	-.0011424 .0036572
meansreport	.1619023	.3365	0.48	0.630	-.4976257 .8214302
_cons	-.1420486	.2268653	-0.63	0.531	-.5866964 .3025992

```
. metareg meaneffectsize meanalc meandvdays meansreport meanpermale meanage,  
wsse(means) mm z
```

```
Meta-regression                               Number of obs   =       15  
Method of moments estimate of between-study variance tau2             =   .000859  
% residual variation due to heterogeneity          I-squared_res   =   1.33%  
Proportion of between-study variance explained     Adj R-squared   =  98.52%  
Joint test for all covariates                     Model chi2(5)   =   18.07  
Without Knapp-Hartung modification                Prob > chi2     =   0.0029
```

meaneffect~e	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
meanalc	.6060621	.2666056	2.27	0.023	.0835246 1.1286
meandvdays	.0009486	.0013287	0.71	0.475	-.0016557 .0035528
meansreport	.300562	.3619525	0.83	0.406	-.4088517 1.009976
meanpermale	.0072633	.0101927	0.71	0.476	-.012714 .0272407
meanage	-.0501597	.1129632	-0.44	0.657	-.2715635 .1712441
_cons	.0950477	2.447029	0.04	0.969	-4.70104 4.891136

```
. outsheet using "HierNeverUseThisModel.out", comma nolabel replace
```

```
.  
. log close  
  name: <unnamed>  
  log: C:\Users\tanneree\Documents\Presentations\Cochrane-C2  
  10\Stata_Output_MultipleLabs.log  
  log type: text  
  closed on: 8 Oct 2010, 11:14:14
```
