**Online Supplement**

# Code for calculating institutional dimensions of pensions among OECD countries and Taiwan in Luxembourg Income Study (LIS), using Stata program

\*set the variables to use\*

global varshh "hid hwgt nhhmem dhi hpub\_a hipension hi33"

global varspp "hid cname dname age"

\*import country data\*

global datasets "kr14 kr16 at16 au14 be16 ca16 cl15 cz16 dk16 fi16 de16 gr16 hu15 ie16 il16 it16 jp13 lt16 mx16 nl16 no16 pl16 sk16 si15 es16 ch16 tw16 uk16 us16"

\*merge household level data to individual level data\*

foreach ccyy in $datasets {

use $varspp using $`ccyy'p, clear

merge m:1 hid using $`ccyy'h, keepusing ($varshh)

\*drop missing values for disposable household income\*

drop if dhi==.

\*drop if household weight missing, recode household weight by number of HH members (Brady and Bostic, 2015)\*

drop if hwgt==.

replace hwgt=0.01 if hwgt==0

gen pwt=hwgt\*nhhmem

\*replace private pension with 0 if missing\*

replace hi33=0 if hi33==.

\*bottom- and top-code and equivalize household disposable income\*

quietly sum dhi [w=hwgt], de

replace dhi=0 if dhi<0

replace dhi=10\*r(p50) if dhi>10\*r(p50)

gen epi=dhi/(nhhmem^0.5)

\*calculate old-age poverty\*

gen oldage=0

replace oldage=1 if age>65

quietly sum epi, de

gen poverty=0

replace poverty=1 if epi<(1/2)\*r(p50)

tabstat poverty if oldage==1, stats(mean)

\*keep old-age population only\*

keep if oldage==1

\*equivalize HH public pensions, assistance pensions by square root of the number of members\*

gen e\_hipension =(hipension-hi33)/(nhhmem^0.5)

gen e\_hpub\_a=hpub\_a/(nhhmem^0.5)

\* for Finland, private pension is not deducted from pension because it is de facto public pension\*

replace e\_hipension =hipension/nhhmem^0.5 if dname=="fi16"

\*calculate pension share, assistance pension share\*

gen Pshare=e\_hipension/epi

gen APshare=e\_hpub\_a/epi

\*pension expenditure is mean of Pshare, assistance pension expenditure is mean of APshare\*

tabstat Pshare [w=pwt], stats (mean)

tabstat APshare [w=pwt], stats (mean)

\*universalism in overall pensions is 1/CV of public pension amount\*

tabstat e\_hipension [w=pwt], stats(cv)

\*low-income targeting in assistance pension is -1 multiplied times concentration coefficient\*

sgini e\_hpub\_a [aweight=pwt], sortvar(epi)

}

# Code for microsimulations in LIS for the 2016 Korea data, using Stata program

\*set the variables to use\*

global varshh "hid hwgt nhhmem nhhmem65 dhi hipension hpub\_a"

global varspp "hid pwgt cname dname age"

\*import 2016 Korea data\*

global datasets "kr16"

\*merge household level data to individual level data\*

foreach ccyy in $datasets {

use $varspp using $`ccyy'p, clear

merge m:1 hid using $`ccyy'h, keepusing ($varshh)

\*drop missing values for disposable household income\*

drop if dhi==.

\*drop if household weight missing, recode household weight by number of HH members\*

drop if hwgt==.

gen pwt=hwgt\*nhhmem

\*create old-age group if age is 65 or more\*

gen oldage=0

replace oldage=1 if age>=65

\*bottom- and top-code household income following standard LIS protocol\*

quietly sum dhi [w=hwgt], de

replace dhi=0 if dhi<0

replace dhi=10\*r(p50) if dhi>10\*r(p50)

**\*\* Old-age poverty and pension provision without assistance pension\*\***

\*create equivalized disposable income without assistance pensions\*

gen dhi\_AP0=dhi-hpub\_a

quietly sum dhi\_AP0, de

replace dhi\_AP0=0 if dhi\_AP0<0

gen epi\_AP0=dhi\_AP0/(nhhmem^0.5)

\*calculate and tabulate all-age poverty and old-age poverty without assistance pensions\*

quietly sum epi\_AP0, de

gen poverty\_AP0=0

replace poverty\_AP0=1 if epi\_AP0<(1/2)\*r(p50)

tabstat poverty\_AP0 [w=pwgt], stats(mean)

tabstat poverty\_AP0 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize public pension without assistance pension\*

gen hipension\_AP0 =hipension-hpub\_a

gen ehipension\_AP0=hipension\_AP0/(nhhmem^0.5)

\*universalism in pensions is 1/CV of the pension amount without assistance pension \*

tabstat ehipension\_AP0 [w=pwt] if oldage==1, stats (cv)

\*calculate gini coefficient for the elderly without assistance pension \*

sgini epi\_AP0 [aweight=pwt] if oldage==1, sortvar (epi\_AP0)

**\*\* Targeting model in practice (the extant assistance pension model in practice, a flat-rate allowance for the bottom 70% of the elderly)\*\***

\*create equivalized disposable income with the factual assistance pension\*

gen epi\_AP=dhi/(nhhmem^0.5)

\*calculate and tabulate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP, de

gen poverty\_AP=0

replace poverty\_AP=1 if epi\_AP<(1/2)\*r(p50)

tabstat poverty\_AP [w=pwgt], stats(mean)

tabstat poverty\_AP [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize all types of public pension and the assistance pension\*

gen ehipension =hipension/(nhhmem^0.5)

gen eAP=hpub\_a/(nhhmem^0.5)

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension [w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the factual assistance pension is -1 multiplied times concentration coefficient generated here\*

sgini eAP [aweight=pwt] if oldage==1, sortvar (epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension \*

sgini epi\_AP [aweight=pwt] if oldage==1, sortvar (epi\_AP)

\*calculate the budget for the assistance pension, which is the mean generated here (i.e. per capita budget among all elderly population)\*

tabstat eAP [w=pwt] if oldage==1, stats (mean)

\*calculate the coverage of the assistance pension and all types of public pension\*

gen AP\_cov=0

replace AP\_cov=1 if eAP>0 & oldage==1

tabstat AP\_cov [w=pwgt] if oldage==1, stats(mean)

gen Pen\_cov=0

replace Pen\_cov=1 if ehipension>0 & oldage==1

tabstat Pen\_cov [w=pwgt] if oldage==1, stats(mean)

**\*\*Targeting model by intention (the extant assistance pension model by intention, a flat-rate allowance for the bottom 70% of the elderly)\*\***

\*create the assistance pension for this model (KRW 2.4 M for the bottom 70 % of the elderly, i.e. those whose yearly income is below KRW 18.5 M)\*

gen AP1=0

replace AP1=2400000/(nhhmem65^0.5) if epi\_AP0<18500000 & oldage==1

\*create the assistance pension amount for each household and equivalize it by HH size\*

gen hAP1=AP1\*nhhmem65

gen eAP1=hAP1/(nhhmem^0.5)

\*create and equivalized disposable income with the assistance pension\*

gen dhi\_AP1= dhi\_AP0+hAP1

quietly sum dhi\_AP1, de

gen epi\_AP1= dhi\_AP1 /(nhhmem^0.5)

replace epi\_AP1=0 if epi\_AP1<0

\*calculate and tabulate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP1, de

gen poverty\_AP1=0

replace poverty\_AP1=1 if epi\_AP1<(1/2)\*r(p50)

tabstat poverty\_AP1 [w=pwgt] , stats(mean)

tabstat poverty\_AP1 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize public pension with the assistance pension\*

gen hipension\_AP1 =hipension\_AP0+hAP1

gen ehipension\_AP1=hipension\_AP1/(nhhmem^0.5)

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension\_AP1 [w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the assistance pension by design is -1 multiplied times concentration coefficient generated here\*

sgini eAP1[aweight=pwt] if oldage==1, sortvar(epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension\*

sgini epi\_AP1[aweight=pwt] if oldage==1, sortvar(epi\_AP1)

\*calculate the budget for the assistance pension\*

tabstat eAP1 [w=pwt] if oldage==1, stats(mean)

\*calculate the coverage of the assistance pension and all types of public pension\*

gen AP1\_cov=0

replace AP1\_cov=1 if eAP1>0 & oldage==1

tabstat AP1\_cov [w=pwgt] if oldage==1, stats(mean)

gen Pen1\_cov=0

replace Pen1\_cov=1 if (ehipension\_AP0+eAP1)> 0 & oldage==1

tabstat Pen1\_cov [w=pwgt] if oldage==1, stats(mean)

**\*\*Universal floor model (to guarantee a minimum floor pension for all elderly, using the same program budget as the targeting by intention model)\*\***

\*create the assistance pension for this model (The guaranteed floor pension is KRW 2.72 M for all elderly, for old-age couples it is KRW 2.72 M divided by square root 2 for each. The assistance pension fills the gap between the floor level and the insurance-based pensions)\*

gen AP2=0

replace AP2=2720000/(nhhmem65^0.5)-ehipension\_AP0 if ehipension\_AP0<2720000 & oldage==1

replace AP2=0 if AP2<0

\*create the assistance pension amount for each household and equivalize it by HH size\*

gen hAP2=AP2\*nhhmem65

gen eAP2=hAP2/(nhhmem^0.5)

\*create and equivalized disposable income with the assistance pension\*

gen dhi\_AP2=dhi\_AP0+hAP2

quietly sum dhi\_AP2, de

gen epi\_AP2=dhi\_AP2/(nhhmem^0.5)

replace epi\_AP2=0 if epi\_AP2<0

\*calculate and tabulate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP2, de

gen poverty\_AP2=0

replace poverty\_AP2=1 if epi\_AP2<(1/2)\*r(p50)

tabstat poverty\_AP2 [w=pwgt], stats(mean)

tabstat poverty\_AP2 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize overall pensions with the assistance pension\*

gen hipension\_AP2 =hipension\_AP0+hAP2

gen ehipension\_AP2 =hipension\_AP2/(nhhmem^0.5)

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension\_AP2 [w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the assistance pension by design is -1 multiplied times concentration coefficient generated here\*

sgini eAP2 [aweight=pwt] if oldage==1, sortvar(epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension\*

sgini epi\_AP2 [aweight=pwt] if oldage==1, sortvar(epi\_AP2)

\*calculate the budget for the assistance pension\*

tabstat eAP2 [w=pwt] if oldage==1, stats(mean)

\*calculate the coverage of the assistance pension and all types of public pension\*

gen poverty\_AP2=0

replace poverty\_AP2=1 if epi\_AP2<(1/2)\*r(p50)

tabstat poverty\_AP2 [w=pwgt], stats(mean)

tabstat poverty\_AP2 [w=pwgt] if oldage==1, stats(mean)

gen Pen2\_cov=0

replace Pen2\_cov=1 if (ehipension\_AP0+eAP2)> 0 & oldage==1

tabstat Pen2\_cov [w=pwgt] if oldage==1, stats(mean)

**\*\*Universal allowance model (a flat-rate benefit for all elderly, using the same budget as the targeting by intention 1)\*\***

\*create the assistance pension for this model (a flat-rate allowance is KRW 1.68 M to all elderly, for couples, 1.68 M divided by square root 2 for each)\*

gen AP3=0

replace AP3=1680000/(nhhmem65^0.5) if oldage==1

\*create the assistance pension amount for each household and equivalize it by HH size\*

gen hAP3=AP3\*nhhmem65

gen eAP3=hAP3/(nhhmem^0.5)

\*create and equivalized disposable income with the assistance pension\*

gen dhi\_AP3= dhi\_AP0+hAP3

quietly sum dhi\_AP3, de

gen epi\_AP3= dhi\_AP3 /(nhhmem^0.5)

replace epi\_AP3=0 if epi\_AP3<0

\*calculate and tabulate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP3, de

gen poverty\_AP3=0

replace poverty\_AP3=1 if epi\_AP3<(1/2)\*r(p50)

tabstat poverty\_AP3 [w=pwgt], stats(mean)

tabstat poverty\_AP3 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize overall pensions with the assistance pension\*

gen hipension\_AP3 =hipension\_AP0+hAP3

gen ehipension\_AP3 =hipension\_AP3/(nhhmem^0.5)

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension\_AP3 [w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the assistance pension by design is -1 multiplied times concentration coefficient generated here\*

sgini eAP3 [aweight=pwt] if oldage==1, sortvar(epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension\*

sgini epi\_AP3 [aweight=pwt] if oldage==1, sortvar(epi\_AP3)

\*calculate the budget for the assistance pension\*

tabstat eAP3 [w=pwt] if oldage==1, stats(mean)

\*calculate the coverage of the assistance pension and all types of public pension\*

gen AP3\_cov=0

replace AP3\_cov=1 if eAP3>0 & oldage==1

tabstat AP3\_cov [w=pwgt] if oldage==1, stats(mean)

gen Pen3\_cov=0

replace Pen3\_cov=1 if (ehipension\_AP0+eAP3)> 0 & oldage==1

tabstat Pen3\_cov [w=pwgt] if oldage==1, stats(mean)

**\*\*Stronger targeting model by intention (a flat-rate allowance for the bottom 36% of the elderly)\*\***

\*create the assistance pension for this model (a flat-rate allowance is KRW 4.8 M for the bottom 36% of the elderly; for couples, 4.8 M divided by square root 2 for each)\*

gen AP4=0

replace AP4=4800000/(nhhmem65^0.5) if epi\_AP0<8350000 & oldage==1

\*create the assistance pension amount for each household and equivalize it by HH size\*

gen hAP4=AP4\*nhhmem65

gen eAP4=hAP4/(nhhmem^0.5)

\*create and equivalized disposable income with the assistance pension\*

gen dhi\_AP4= dhi\_AP0+hAP4

quietly sum dhi\_AP4, de

gen epi\_AP4= dhi\_AP4 /(nhhmem^0.5)

replace epi\_AP4=0 if epi\_AP4<0

\*calculate and tabulate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP4, de

gen poverty\_AP4=0

replace poverty\_AP4=1 if epi\_AP4<(1/2)\*r(p50)

tabstat poverty\_AP4 [w=pwgt] , stats(mean)

tabstat poverty\_AP4 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize overall pensions with the assistance pension\*

gen hipension\_AP4 =hipension\_AP0+hAP4

gen ehipension\_AP4=hipension\_AP4/(nhhmem^0.5)

gen penshare\_AP4=ehipension\_AP4/epi\_AP4

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension\_AP4[w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the assistance pension by design is -1 multiplied times concentration coefficient generated here\*

sgini eAP4[aweight=pwt] if oldage==1, sortvar(epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension\*

sgini epi\_AP4[aweight=pwt] if oldage==1, sortvar(epi\_AP4)

\*calculate the budget for the assistance pension\*

tabstat eAP4 [w=pwt] if oldage==1, stats(mean)

\*calculate the coverage of the assistance pension and all types of public pension\*

gen AP4\_cov=0

replace AP4\_cov=1 if eAP4>0 & oldage==1

tabstat AP4\_cov [w=pwgt] if oldage==1, stats(mean)

gen Pen4\_cov=0

replace Pen4\_cov=1 if (ehipension\_AP0+eAP4)> 0 & oldage==1

tabstat Pen4\_cov [w=pwgt] if oldage==1, stats(mean)

**\*\*Universal floor model 2 (to guarantee a minimum floor pension for all elderly, equivalent to the floor level of social assistance for the non-elderly)\*\***

\*create the assistance pension for this model (the guaranteed floor pension is KRW 5.65 M for all elderly, for couples it is KRW 5.65 M divided by square root 2 for each)\*

gen AP5=0

replace AP5=5650000/(nhhmem65^0.5)-ehipension\_AP0 if ehipension\_AP0<5650000 & oldage==1

replace AP5=0 if AP5<0

\*create the assistance pension amount for each household and equivalize it by HH size\*

gen hAP5=AP5\*nhhmem65

gen eAP5=hAP5/(nhhmem^0.5)

\*create and equivalized disposable income with the assistance pension\*

gen dhi\_AP5= dhi\_AP0+hAP5

quietly sum dhi\_AP5, de

gen epi\_AP5= dhi\_AP5 /(nhhmem^0.5)

replace epi\_AP5=0 if epi\_AP5<0

\*calculate and tabulate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP5, de

gen poverty\_AP5=0

replace poverty\_AP5=1 if epi\_AP5<(1/2)\*r(p50)

tabstat poverty\_AP5 [w=pwgt] ,stats(mean)

tabstat poverty\_AP5 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize overall pensions with the assistance pension\*

gen hipension\_AP5 =hipension\_AP0+hAP5

gen ehipension\_AP5 =hipension\_AP5/(nhhmem^0.5)

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension\_AP5 [w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the assistance pension by design is -1 multiplied times concentration coefficient generated here\*

sgini eAP5 [aweight=pwt] if oldage==1, sortvar(epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension\*

sgini epi\_AP5 [aweight=pwt] if oldage==1, sortvar(epi\_AP5)

\*calculate the budget for the assistance pension\*

tabstat eAP5 [w=pwt] if oldage==1, stats(mean)

\*calculate the coverage of the assistance pension and all types of public pension \*

gen AP5\_cov=0

replace AP5\_cov=1 if eAP5>0 & oldage==1

tabstat AP5\_cov [w=pwgt] if oldage==1, stats(mean)

gen Pen5\_cov=0

replace Pen5\_cov=1 if (ehipension\_AP0+eAP5)> 0 & oldage==1

tabstat Pen5\_cov [w=pwgt] if oldage==1, stats(mean)

**\*\*Universal allowance model 2 (a flat-rate allowance for all elderly, using the same budget as the universal floor model 2)\*\***

\*create the assistance pension for this model (the same 4.06 M for all elderly, for couples, 4.06 M divided by square root 2 for each)\*

gen AP6=0

replace AP6=4060000/(nhhmem65^0.5) if oldage==1

\*create the assistance pension amount for each household and equivalize it by HH size\*

gen hAP6=AP6\*nhhmem65

gen eAP6=hAP6/(nhhmem^0.5)

\*create and equivalized disposable income with the assistance pension\*

gen dhi\_AP6= dhi\_AP0+hAP6

quietly sum dhi\_AP6, de

gen epi\_AP6= dhi\_AP6 /(nhhmem^0.5)

replace epi\_AP6=0 if epi\_AP6<0

\*calculate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP6, de

gen poverty\_AP6=0

replace poverty\_AP6=1 if epi\_AP6<(1/2)\*r(p50)

tabstat poverty\_AP6 [w=pwgt], stats(mean)

tabstat poverty\_AP6 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize overall pensions with the assistance pension\*

gen hipension\_AP6 =hipension\_AP0+hAP6

gen ehipension\_AP6 =hipension\_AP6/(nhhmem^0.5)

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension\_AP6 [w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the assistance pension by design is -1 multiplied times concentration coefficient generated here\*

sgini eAP6 [aweight=pwt] if oldage==1, sortvar(epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension\*

sgini epi\_AP6 [aweight=pwt] if oldage==1, sortvar(epi\_AP6)

\*calculate the budget for the assistance pension\*

tabstat eAP6 [w=pwt] if oldage==1, stats(mean)

\*calculate the coverage of the assistance pension and all types of public pension\*

gen AP6\_cov=0

replace AP6\_cov=1 if eAP6>0 & oldage==1

tabstat AP6\_cov [w=pwgt] if oldage==1, stats(mean)

gen Pen6\_cov=0

replace Pen6\_cov=1 if (ehipension\_AP0+eAP6)> 0 & oldage==1

tabstat Pen6\_cov [w=pwgt] if oldage==1, stats(mean)

**\*\*Targeting model by intention 2 (a flat-rate allowance for the bottom 70 % of the elderly, using the same budget as the universal floor model 2)\*\***

\*create the assistance pension for this model (A flat-rate allowance of KRW 5.9 M for the bottom 70 % of the elderly. KRW 18.5 M is the income threshold)\*

gen AP7=0

replace AP7=5900000/(nhhmem65^0.5) if epi\_AP0<18500000 & oldage==1

\*create the assistance pension amount for each household and equivalize it by HH size\*

gen hAP7=AP7\*nhhmem65

gen eAP7=hAP7/(nhhmem^0.5)

\*create and equivalized disposable income with the assistance pension\*

gen dhi\_AP7= dhi\_AP0+hAP7

quietly sum dhi\_AP7, de

gen epi\_AP7= dhi\_AP7 /(nhhmem^0.5)

replace epi\_AP7=0 if epi\_AP7<0

\*calculate all- and old-age poverty with the assistance pension\*

quietly sum epi\_AP7, de

gen poverty\_AP7=0

replace poverty\_AP7=1 if epi\_AP7<(1/2)\*r(p50)

tabstat poverty\_AP7 [w=pwgt], stats(mean)

tabstat poverty\_AP7 [w=pwgt] if oldage==1, stats(mean)

\*create and equivalize overall pensions with the assistance pension\*

gen hipension\_AP7 =hipension\_AP0+hAP7

gen ehipension\_AP7=hipension\_AP7/(nhhmem^0.5)

\*universalism in pensions is 1/CV of overall pension amount including the assistance pension\*

tabstat ehipension\_AP7 [w=pwt] if oldage==1, stats(cv)

\*low-income targeting in the assistance pension by design is -1 multiplied times concentration coefficient generated here\*

sgini eAP7[aweight=pwt] if oldage==1, sortvar(epi\_AP0)

\*calculate gini coefficient among the elderly with the assistance pension\*

sgini epi\_AP7[aweight=pwt] if oldage==1, sortvar(epi\_AP7)

\*calculate the coverage of the assistance pension\*

tabstat eAP7 [w=pwt] if oldage==1, stats(mean)

\*calculate the coverage of the assistance pension and all types of public pension\*

gen AP7\_cov=0

replace AP7\_cov=1 if eAP7>0 & oldage==1

tabstat AP7\_cov [w=pwgt] if oldage==1, stats(mean)

gen Pen7\_cov=0

replace Pen7\_cov=1 if (ehipension\_AP0+eAP7)> 0 & oldage==1

tabstat Pen7\_cov [w=pwgt] if oldage==1, stats(mean)

}