PROTOCOLE INITIAL GLOBAL
PUIS ECLATEMENT PAR ANNEE
27-12-21

The protocol uses the R software, with the package “xlsx” (necessary to make the link wih Excel) and Excel (or LibreOfficeCalc or OpenOfficeCalc).

I underline that I am not an expert in coding neither in R language, but an economist and user of national accounts.

The IOT in prices is given under the name “wiot” in R language on the site WIOD and other data are given on an Excel format under the name of "socio-economic accounts"

The structure of the “dataframe” “wiot” is:

<table>
<tr><td>Columns and rows numbers</td><td>6 to 2469</td><td>2470 to 2689</td><td>2690</td></tr>
<tr><td>1 to 2464</td><td>Intermediate consumption CI</td><td>Final uses EF</td><td rowspan="10">totals</td></tr>
<tr><td>2465</td><td colspan="2">totals</td></tr>
<tr><td>2466</td><td colspan="2">Taxes less subsidies</td></tr>
<tr><td>2467</td><td colspan="2">Cif/fob adjustments (line null)</td></tr>
<tr><td>2468</td><td></td><td>Direct purchases abroad by residents</td></tr>
<tr><td>2469</td><td></td><td>Purchases on the domestic territory by non-residents</td></tr>
<tr><td>2470</td><td>Value added at basic prices</td><td></td></tr>
<tr><td>2471</td><td colspan="2">International Transport Margins</td></tr>
<tr><td>2472</td><td>Output at basic prices</td><td></td></tr>
</table>

The final uses of each area are divided between consumption of households (1), of NPIH’s (2), of government (3), GFCF (4) and increase of inventories (5).

Ouvrir un répertoire de travail général
- mettrre le fichier plage.xlsx partie utile de WIOD_SEA_Nov16trié.xlsx
- y mettre le fichier plageTxChge.xlsx partie utile de EXR_WIOD_Nov16.xlsx

- y mettre le fichier wiot_r_Nov16.zip
- y mettre le fichier partage.rda, les fichiers codeszones.rda et codesbrches.rda

Programme R dans le fichier général

```
install.packages("xlsx")
library(xlsx)
```

```
#if the installation of the package is not correct, verify that javascript is correctly installed
#on the computer

read.xlsx("plage.xlsx", sheetIndex=1, header =FALSE)->LABGENERAL
read.xlsx("plageTxChge.xlsx ", sheetIndex=1, header =FALSE)->TXCHGEGENE

 ALABLOCCUR<-array(as.matrix(LABGENERAL),dim=c(56,43,15))
#ouverture de ALABUSDGENE bidon pour dimentionnement
ALABUSDGENE<- ALABLOCCUR
 for (y in 1:15)
for (p in 1:43)
for (b in 1:56)
ALABUSDGENE[b,p,y]<- ALABLOCCUR[b,p,y]*as.matrix(TXCHGEGENE[p,y])
unzip("wiot_r_Nov16.zip")
#sauvegarde pour passage au fichier annuel
save(ALABUSDGENE, file="ALABUSDGENE")
# création des répertoires annuels
for (y in 2000:2014)
dir.create(as.character(y))
```

Dans chaque fichier annuel :
mettre ALABUSDGENE, codesbrches.rda
codeszones.rda, partage.rda, le WIOT...rda de l'année, l'ouvir et faire tourner le prog ci*dessous

#1° **Building of $\overrightarrow{VA'}$ (LABCOMPLET)**

```
library(xlsx)
matrix(unlist(wiot[2470,6:2413]),nrow=56)-> matVAPAYS
wiot[1,5]->a
aa<-as.character(a)
load("ALABUSDGENE")
load("codesbrches.rda")
load("codeszones.rda")
ALABUSDGENE[,,a-1999]->matLABPAYS
rowSums(matLABPAYS)/rowSums(matVAPAYS)->rapport
rapport*unlist(wiot[2470,2414:2469])->LABROW
cbind(matLABPAYS,LABROW)->matLABCOMPLET
LABCOMPLET<-as.vector(matrix(matLABCOMPLET,ncol=1))
matLABCOMPLET1<-cbind(matLABCOMPLET,rowSums(matLABCOMPLET))
matLABCOMPLET2<-
rbind(matLABCOMPLET1,colSums(matLABCOMPLET1),rep("",times=45),rep("",times=45))
libellVA<-matrix(c(wiot[1:56,2],"","",""),nrow=59)
matLABCOMPLET3<-data.frame(libellVA,matLABCOMPLET2)
colnames(matLABCOMPLET3)<-c("",as.vector(codeszones),"totals")
rownames(matLABCOMPLET3)<-c(as.vector(codesbrches),"totals","millions of USD",
      paste("Year",aa))
```

#2° Determination of $\vec{K}$ (Klab in R language)

```
unlist(wiot[2472,6:2469])->sigma
#We had to transform the vector sigma in  the diagonal matrix diag(sigma) and to invert #diag(sigma)-CI
#but this last matrix is not invertible, so first all we replace all the 0 of sigma by 1
replace(sigma, sigma==0,1)->sigmacor
CI<-as.matrix(wiot[1:2464,6:2469])
Klab<-solve(t(diag(sigmacor)- CI),LABCOMPLET)
```

#3° synthesis and verification

```
CIlab<-diag(Klab)%*%CI
efprix<-wiot[1:2464,2470:2689]
eflab<-diag(Klab)%*%as.matrix(efprix)
sum(CIlab)
sum(eflab)
sigmacorlab<-sigmacor*Klab
sum(CIlab)+sum(eflab)-sum(sigmacorlab)
#must be null
sum(LABCOMPLET)
sum(eflab)-sum(LABCOMPLET)
#must be null
```

#4° determination of $\vec{C}$, $\vec{C}'$, and $\vec{\Pi}$

```
#56 activities, 44 areas producers, 5 types, 44 areas purchasers
Adefprix<- array(as.matrix(efprix), c(56,44,5,44))
#sheet 1 building of the matrix Ctotprix giving the total consumption (by households, NPISH's, #governments)
of each of the 2,464 products measured in prices
Ctotprix<- matrix(1:2464,nrow=56)
for (b in 1:56)
for (p in 1:44)
Ctotprix[b,p]<- sum(Adefprix[b,p,1:3,])
Ctotprix1<-cbind(Ctotprix,rowSums(Ctotprix))
Ctotprix2<-rbind(Ctotprix1,colSums(Ctotprix1),rep("",times=45),rep("",times=45))

Ctotprix3<-data.frame(libellVA,Ctotprix2)

dimnames(Ctotprix3)<-dimnames(matLABCOMPLET3)

#sheet 2  building of the matrix Ctotlab giving the total consumption of each of the 2,464 products
#measured in labour-value
Ctotlab<- Ctotprix
Adeflab<- array(eflab, c(56,44,5,44))
for (b in 1:56)
for (p in 1:44)
Ctotlab[b,p]<- sum(Adeflab[b,p,1:3,])
Ctotlab1<-cbind(Ctotlab,rowSums(Ctotlab))
Ctotlab2<-rbind(Ctotlab1,colSums(Ctotlab1),rep("",times=45),rep("",times=45))
Ctotlab3<-data.frame(libellVA,Ctotlab2)

dimnames(Ctotlab3)<-dimnames(matLABCOMPLET3)
```

#sheet3 profits on consumption by each activity
Ctotdelta1<- Ctotprix1-Ctotlab1
Ctotdelta2<-rbind(Ctotdelta1,colSums(Ctotdelta1),rep("",times=45),rep("",times=45))
Ctotdelta3<-data.frame(libellVA,Ctotdelta2)
dimnames(Ctotdelta3)<-dimnames(matLABCOMPLET3)

#5° Exchanges of IC

#sheet 4 profits from selling intermediate consumption
gainsvtesCI<- matrix(rowSums(CI)-rowSums(CIlab),nrow=56)
gainsvtesCI1<-cbind(gainsvtesCI,rowSums(gainsvtesCI))
gainsvtesCI2<-rbind(gainsvtesCI1,colSums(gainsvtesCI1),rep("",times=45),rep("",times=45))
gainsvtesCI3<-data.frame(libellVA,gainsvtesCI2)
dimnames(gainsvtesCI3)<-dimnames(Ctotprix3)

#sheet 5 losses when buying intermediate consumption
pertesachCI<- matrix(colSums(CI)-colSums(CIlab),nrow=56)
pertesachCI1<-cbind(pertesachCI,rowSums(pertesachCI))
pertesachCI2<-rbind(pertesachCI1,colSums(pertesachCI1),rep("",times=45),rep("",times=45))
pertesachCI3<-data.frame(libellVA,pertesachCI2)
dimnames(pertesachCI3)<-dimnames(Ctotprix3)

#sheet 6 net profits from exchanges of IC
gainsnetsCI1<- gainsvtesCI1- pertesachCI1
gainsnetsCI2<-rbind(gainsnetsCI1,colSums(gainsnetsCI1),rep("",times=45),rep("",times=45))
gainsnetsCI3<-data.frame(libellVA,gainsnetsCI2)

dimnames(gainsnetsCI3)<-dimnames(Ctotprix3)

#sheet7
profitApresEchCI1<-Ctotdelta1+gainsnetsCI1
profitApresEchCI2<-
rbind(profitApresEchCI1,colSums(profitApresEchCI1),rep("",times=45),rep("",times=45))
profitApresEchCI3<-data.frame(libellVA, profitApresEchCI2)
dimnames(profitApresEchCI3)<-dimnames(Ctotprix3)

#6° Profits from sales of GFCF ($\vec{I} - \vec{I}'$) (sheet 11)

#gainsvtesFBCF is a matrix (56 x 43) giving the profit coming of the sales of GFCF for each #activity
gainsvtesFBCF<-Ctotprix
Adefdeltalab<- Adefprix-Adeflab
for(b in 1:56)
for (p in 1:44)
gainsvtesFBCF[b,p]<- sum(Adefdeltalab[b,p,4,])

```
gainsvtesFBCF1<-cbind(gainsvtesFBCF, rowSums(gainsvtesFBCF))
gainsvtesFBCF2<-rbind(gainsvtesFBCF1, colSums(gainsvtesFBCF1),rep("",times=45),rep("",times=45))
gainsvtesFBCF3<-data.frame(libellVA,gainsvtesFBCF2)

dimnames(gainsvtesFBCF3)<-dimnames(Ctotprix3)
```

#7° Losses from purchasing of GFCF (sheet 9)

#a) Total losses of each area when buying GFCF

```
pertesAchFBCFparPays<-c(1:44)
for (p in 1:44)
pertesAchFBCFparPays[p]<- sum(Adefdeltalab[,,4,p])
sum(gainsvtesFBCF)-sum(pertesAchFBCFparPays)
#must be null
```

#b) loss of each productive unit when buying GFCF

```
#Due to the accounting rules it is impossible to calculate these losses from "wiot" only.
#I suggest to divide the losses of each area, as they have been calculated between the different #activities of this area by using the matrix (56 x 56) "partage" giving the repartition of 10,000
 #units of product b (varying from 1 to 56) sold as fixed capital between the purchasing activities ba #(varying from 1 to 56)
#getting the object "partage''
load("partage.rda")
#we get the loss of the activity ba of the area pa when buying the fixed capital b of the area p
achFBCFbrpaysdeltalab<-array(1,dim=c(56,44,44,56))
for(b in 1:56)
  for (ba in 1:56)
 for(p in 1:44)
  for(pa in 1:44)
 achFBCFbrpaysdeltalab[b,p,pa,ba]<-Adefdeltalab[b,p,4,pa]*partage[b,ba]/10000
#and  the loss of the activity ba of the area pa when buying fixed capital from any productive unit
pertesFBCF<-Ctotprix
for (pa in 1:44)
for (ba in 1:56)
pertesFBCF[ba,pa]<-sum(achFBCFbrpaysdeltalab[,,pa,ba])
pertesFBCF1<-cbind(pertesFBCF, rowSums(pertesFBCF))
pertesFBCF2<-rbind(pertesFBCF1, colSums(pertesFBCF1),rep("",times=45),rep("",times=45))
pertesFBCF3<-data.frame(libellVA,pertesFBCF2)
dimnames(pertesFBCF3)<-dimnames(Ctotprix3)


sum(pertesAchFBCFparPays)-sum(pertesFBCF)
#must be small. It is not null because of approximations in calculations
```

#8°Profits coming from increase of inventories ($\overrightarrow{\Delta S} - \overrightarrow{\Delta S'}$) (sheet 9)

```
gainsStocksProd<-Ctotprix
for(b in 1:56)
 for(p in 1:44)
gainsStocksProd[b,p]<-sum(Adefdeltalab[b,p,5,])
gainsStocksProd1<-cbind(gainsStocksProd, rowSums(gainsStocksProd))
gainsStocksProd2<-rbind(gainsStocksProd1, colSums(gainsStocksProd1),rep("",times=45),rep("",times=45))
```

```
gainsStocksProd3<-data.frame(libellVA,gainsStocksProd2)
dimnames(gainsStocksProd3)<-dimnames(Ctotprix3)
```

#9° Displaying of the results in Excel format through package "xlsx"
#a) vectors $\overrightarrow{VA}$' and $\vec{K}$

```
paste("vectorsVA'andK.Year",aa,".xlsx",sep="")->z

write.xlsx(matLABCOMPLET3, file =z, sheetName="vector VA'")

matKlab<-matrix(Klab, nrow=56)
matKlab2<-rbind(matKlab,rep("",times=44))
libellK<-matrix(c(wiot[1:56,2],""),nrow=57)
matKlab3<-data.frame(libellK,matKlab2)

rownames(matKlab3)<-c(as.vector(codesbrches), paste("Year",aa))
colnames(matKlab3)<-c("",as.character(codeszones))
write.xlsx(matKlab3, file =z, sheetName="vector K", append=TRUE)
```

#b) profit formation

```
paste("OS'sFormation.Year",aa,".xlsx",sep="")->pf
write.xlsx(Ctotprix3, file =pf, sheetName="1. vector C")
write.xlsx(Ctotlab3, file =pf, sheetName="2. vector C'", append=TRUE)
write.xlsx(Ctotdelta3, file =pf, sheetName="3. vector Pi", append=TRUE)
write.xlsx(gainsvtesCI3, file =pf, sheetName="4. Earnings from IC", append=TRUE)
write.xlsx(pertesachCI3, file =pf, sheetName="5. Losses from IC", append=TRUE)
write.xlsx(gainsnetsCI3, file =pf,sheetName="6. Net earnings from IC", append=TRUE)
write.xlsx(profitApresEchCI3, file =pf, sheetName="7. Margins after IC exchanges", append=TRUE)
write.xlsx(gainsvtesFBCF3, file =pf, sheetName="8. Earnings from GFCF", append=TRUE)
write.xlsx(gainsStocksProd3, file =pf, sheetName="9. Margins from inventories", append=TRUE)
AccountingProfit1<- profitApresEchCI1+gainsvtesFBCF1+gainsStocksProd1
AccountingProfit2<-rbind(AccountingProfit1,colSums(AccountingProfit1),rep("",times=45),rep("",times=45))
AccountingProfit3<-data.frame(libellVA,AccountingProfit2)
rownames(AccountingProfit3)<-rownames(Ctotprix3)
colnames(AccountingProfit3)<-colnames(Ctotprix3)
write.xlsx(AccountingProfit3, file =pf, sheetName="10. Accounting OS's", append=TRUE)
write.xlsx(pertesFBCF3, file =pf, sheetName="11. Losses from GFCF", append=TRUE)
netFBCF1<- gainsvtesFBCF1-pertesFBCF1
netFBCF2<- rbind(netFBCF1,colSums(netFBCF1),rep("",times=45),rep("",times=45))
netFBCF3<-data.frame(libellVA,netFBCF2)
dimnames( netFBCF3)<-dimnames(Ctotprix3)
write.xlsx(netFBCF3, file =pf, sheetName="12. Net Earnings from GFCF", append=TRUE)
FinalProfitsValue1<- profitApresEchCI1+gainsvtesFBCF1-pertesFBCF1
FinalProfitsValue2<-rbind(FinalProfitsValue1,colSums(FinalProfitsValue1),rep("",times=45),rep("",times=45))
FinalProfitsValue3<-data.frame(libellVA,FinalProfitsValue2)
dimnames(FinalProfitsValue3)<-dimnames(Ctotprix3)
write.xlsx(FinalProfitsValue3, file =pf, sheetName="13. OS's in Value", append=TRUE)
```

```
W<-loadWorkbook(pf)
sheetW<-getSheets(W)
for (m in 1:13)
{setColumnWidth(sheetW[[m]],2,50)
 createFreezePane(sheetW[[m]],2,3)}
saveWorkbook(W,file=pf)


V<-loadWorkbook(z)
sheetV<-getSheets(V)
for (n in 1:2)
{setColumnWidth(sheetV[[n]],2,50)
 createFreezePane(sheetV[[n]],2,3)}
saveWorkbook(V,file=z)
```