

R – Code: Bilateral Gross Export Decomposition

```
d.AVX <- read.table("/Users/katharinalangle/Desktop/Master Thesis/R/2011/AVX11.txt", sep =
"\t", header = TRUE)
d.Y <- read.table("/Users/katharinalangle/Desktop/Master Thesis/R/2011/Y11.txt", sep = "\t",
header = TRUE)
d.A <- read.table("/Users/katharinalangle/Desktop/Master Thesis/R/2011/A11.txt", sep = "\t",
header = TRUE)
d.EX <- read.table("/Users/katharinalangle/Desktop/Master Thesis/R/2011/EX11.txt", sep =
"\t", header = TRUE)
```

```
E <- diag(1435)
A <- as.matrix(d.A)
Y <- as.matrix(d.Y)
EX <- as.matrix(d.EX)
```

```
EA <- E-A
B <- solve(EA)
B <- as.matrix(B)
```

Lists

```
country_list <- c(seq(1,41,by=1))
country_list_woFRA <- country_list[-15]
country_list_preFRA <- c(seq(1,14,by=1))
country_list_aftFRA <- c(seq(15,41,by=1))
country_list_woRoW <- country_list[-41]
```

Often used Coefficients

```
##VsLss
```

```
# Vs
V <- d.AVX[1436,]
V <- as.vector(V)
Vall <- V[491:525]
V <- as.numeric(V)
Vall <- as.vector(Vall)
Vall <- as.numeric(Vall)
Vs = NULL
for ( i in country_list) {Vs[[i]] = t(Vall)}
```

```
#IAss
```

```
Ass <- A[491:525,491:525]
I <- diag(35)
IAss1 <- I-Ass
IAss1a <- solve(IAss1)
IAss = NULL
for ( i in country_list) {IAss[[i]] = IAss1a}
```

```
VsLss = NULL
```

```
for (i in country_list) {VsLss[[i]] = Vs[[i]] %*% IAss[[i]}
```

1 Element

```
#V
V <- d.AVX[1436,]
Vall <- V[491:525]
Vall <- as.vector(Vall)
Vall <- as.numeric(Vall)

#Bss
EA <- E-A
Bss1 <- solve(EA)
Bss <- Bss1[(491:525),(491:525)]
```

```
#Ysr
Ysr1 <- Y[,-15]
Ysr1a <- Ysr1[(491:525),]
Ysr <- rowSums(Ysr1a)
```

```
Z1 <- Vall %*% Bss
Z1a <- Z1 * Ysr
```

```
Erg1_F <- Z1a[15]
Erg1_F
```

2 Element

```
#Asr
Asr=NULL
for (i in country_list) {Asr[[i]] = A[491:525, ((i-1)*35+1):(35*i)] }
```

```
#Brr
Brr=NULL
for (i in country_list) {Brr[[i]] = B[ ((i-1)*35+1):(35*i) , ((i-1)*35+1):(35*i)] }
```

```
#Yrr
Yrr = NULL
for (i in country_list) { Yrr[[i]] = Y[ ((i-1)*35+1):(35*i) ,i] }
```

#Interim Result

```
#Z2
Z2 = NULL
for (i in country_list) {Z2[[i]] = Asr[[i]] %*% Brr[[i]] %*% Yrr[[i]] }
for (i in country_list) {Z2[[i]] <- as.vector(Z2[[i]]) }
```

```
Z2a = NULL
for (i in country_list) {Z2a[[i]] = VsLss[[i]] * Z2[[i]] }
```

```
Z2b <- rbind(Z2a[[1]], Z2a[[2]], Z2a[[3]], Z2a[[4]], Z2a[[5]], Z2a[[6]], Z2a[[7]], Z2a[[8]],
  Z2a[[9]], Z2a[[11]], Z2a[[12]], Z2a[[13]], Z2a[[14]], Z2a[[10]], Z2a[[16]], Z2a[[17]], Z2a[[18]],
  Z2a[[19]], Z2a[[20]], Z2a[[21]], Z2a[[22]], Z2a[[23]], Z2a[[24]], Z2a[[25]], Z2a[[26]], Z2a[[27]],
  Z2a[[28]], Z2a[[29]], Z2a[[30]], Z2a[[31]], Z2a[[32]], Z2a[[33]], Z2a[[34]], Z2a[[35]], Z2a[[36]],
  Z2a[[37]], Z2a[[38]], Z2a[[39]], Z2a[[40]], Z2a[[41]] )
```

```
Z2c <- colSums(Z2b)
Erg2_F <- Z2c[15]
Erg2_F
```

3 Element

```
#Brt
Brt1 = NULL
for (i in country_list) {Brt1[[i]] = B[(((i-1)*35+1):(35*i) , -(((i-1)*35+1):(35*i))]}
Brt = NULL
for (i in country_list_preFRA) {Brt[[i]] = Brt1[[i]][ , -(456:490) ]}
for (i in country_list_aftFRA) {Brt[[i]] = Brt1[[i]][ , -(491:525) ]}
```

```
#Ytt
Ytt1 = NULL
for (i in country_list) {Ytt1[[i]] = Y[ -(((i-1)*35+1):(35*i)), (-i) ]}
Ytt1a = NULL
for (i in country_list_preFRA) {Ytt1a[[i]] = Ytt1[[i]][ -(456:490) , -14 ]}
for (i in country_list_aftFRA) {Ytt1a[[i]] = Ytt1[[i]][ -(491:525) , -15 ]}
Ytt = NULL
for (i in country_list) {Ytt[[i]] = rowSums(Ytt1a[[i]])}
```

```
#Z3
Z3 = NULL
for (i in country_list) {Z3[[i]] = Brt[[i]] %*% Ytt[[i]]}
```

```
Z3a = NULL
for (i in country_list) {Z3a[[i]] = Asr[[i]] %*% Z3[[i]]}
for (i in country_list) {Z3a[[i]] <- as.vector(Z3a[[i]])}
```

```
Z3b = NULL
for (i in country_list) {Z3b[[i]] = VsLss[[i]] * Z3a[[i]]}
```

```
Z3c <- rbind(Z3b[[1]], Z3b[[2]], Z3b[[3]], Z3b[[4]], Z3b[[5]], Z3b[[6]], Z3b[[7]], Z3b[[8]],
  Z3b[[9]], Z3b[[11]], Z3b[[12]], Z3b[[13]], Z3b[[14]], Z3b[[10]], Z3b[[16]], Z3b[[17]], Z3b[[18]],
  Z3b[[19]], Z3b[[20]], Z3b[[21]], Z3b[[22]], Z3b[[23]], Z3b[[24]], Z3b[[25]], Z3b[[26]], Z3b[[27]],
  Z3b[[28]], Z3b[[29]], Z3b[[30]], Z3b[[31]], Z3b[[32]], Z3b[[33]], Z3b[[34]], Z3b[[35]], Z3b[[36]],
  Z3b[[37]], Z3b[[38]], Z3b[[39]], Z3b[[40]], Z3b[[41]] )
```

```
Z3d <- colSums(Z3c)
Erg3_F <- Z3d[15]
Erg3_F
```

####4 Element

```
#Yrt
Yrt1a = NULL
for (i in country_list) { Yrt1a[[i]] = Y[ ((i-1)*35+1):(35*i) , (-i) ] }
Yrt1 = NULL
for (i in country_list_preFRA) { Yrt1[[i]] = Yrt1a[[i]][ , -14 ] }
for (i in country_list_aftFRA) { Yrt1[[i]] = Yrt1a[[i]][ , -15 ] }
Yrt1[[i]] <- as.matrix(Yrt1[[i]])
Yrt = NULL
for ( i in country_list) {Yrt[[i]] = rowSums(Yrt1[[i]])}

Z4 = NULL
for (i in country_list) {Z4[[i]] = Asr[[i]] %*% Brr[[i]] %*% Yrt[[i]]}
for (i in country_list) {Z4[[i]] <- as.vector(Z4[[i]])}
```

Z4a = NULL

```
for ( i in country_list) {Z4a[[i]] = VsLss[[i]] * Z4[[i]]}
```

```
Z4b <- rbind(Z4a[[1]], Z4a[[2]], Z4a[[3]], Z4a[[4]], Z4a[[5]], Z4a[[6]], Z4a[[7]], Z4a[[8]],
  Z4a[[9]], Z4a[[11]], Z4a[[12]], Z4a[[13]], Z4a[[14]], Z4a[[10]], Z4a[[16]], Z4a[[17]], Z4a[[18]],
  Z4a[[19]], Z4a[[20]], Z4a[[21]], Z4a[[22]], Z4a[[23]], Z4a[[24]], Z4a[[25]], Z4a[[26]], Z4a[[27]],
  Z4a[[28]], Z4a[[29]], Z4a[[30]], Z4a[[31]], Z4a[[32]], Z4a[[33]], Z4a[[34]], Z4a[[35]], Z4a[[36]],
  Z4a[[37]], Z4a[[38]], Z4a[[39]], Z4a[[40]], Z4a[[41]] )
```

Z4c <- colSums(Z4b)

Erg4_F <- Z4c[15]

Erg4_F

####5 Element

#Ytr = Ytu since u /= s,t see page 35/36 Wang Wei Zhu

Ytr1 = NULL

```
for (i in country_list) {Ytr1[[i]] = Y[-(((i-1)*35+1):(35*i)), i]}
```

Ytr = NULL

```
for (i in country_list_preFRA) {Ytr[[i]] = Ytr1[[i]][ - (456:490) ] }
```

```
for (i in country_list_aftFRA) {Ytr[[i]] = Ytr1[[i]][ - (491:525) ] }
```

Brt1 = NULL

```
for (i in country_list) {Brt1[[i]] = B[ ((i-1)*35+1):(35*i) , - (((i-1)*35+1):(35*i)) ] }
```

Brt = NULL

```
for (i in country_list_preFRA) {Brt[[i]] = Brt1[[i]][ , -(456:490) ] }
```

```
for (i in country_list_aftFRA) {Brt[[i]] = Brt1[[i]][ , -(491:525) ] }
```

Z5 = NULL

```
for (i in country_list) {Z5[[i]] = Asr[[i]] %*% Brt[[i]] %*% Ytr[[i]]}
```

```
for (i in country_list) {Z5[[i]] <- as.vector(Z5[[i]])}
```

Z5a = NULL

```
for (i in country_list) {Z5a[[i]] = VsLss[[i]] * Z5[[i]]}
```

```
Z5b <- rbind(Z5a[[1]], Z5a[[2]], Z5a[[3]], Z5a[[4]], Z5a[[5]], Z5a[[6]], Z5a[[7]], Z5a[[8]],
  Z5a[[9]], Z5a[[11]], Z5a[[12]], Z5a[[13]], Z5a[[14]], Z5a[[10]], Z5a[[16]], Z5a[[17]], Z5a[[18]],
  Z5a[[19]], Z5a[[20]], Z5a[[21]], Z5a[[22]], Z5a[[23]], Z5a[[24]], Z5a[[25]], Z5a[[26]], Z5a[[27]],
  Z5a[[28]], Z5a[[29]], Z5a[[30]], Z5a[[31]], Z5a[[32]], Z5a[[33]], Z5a[[34]], Z5a[[35]], Z5a[[36]],
  Z5a[[37]], Z5a[[38]], Z5a[[39]], Z5a[[40]], Z5a[[41]] )
```

```
Z5c <- colSums(Z5b)
Erg5_F <- Z5c[15]
Erg5_F
```

#####6 Element

```
#Yrs
Yrs = NULL
for ( i in country_list) {Yrs[[i]]=Y[((i-1)*35+1):(35*i) , 15]}
```

```
Z6 = NULL
for (i in country_list) {Z6[[i]] = Asr[[i]] %*% Brr[[i]] %*% Yrs[[i]] }
for (i in country_list) {Z6[[i]] <- as.vector(Z6[[i]])}
```

```
Z6a = NULL
for (i in country_list) {Z6a[[i]] = VsLss[[i]] * Z6[[i]]}
```

```
Z6b <- rbind(Z6a[[1]], Z6a[[2]], Z6a[[3]], Z6a[[4]], Z6a[[5]], Z6a[[6]], Z6a[[7]], Z6a[[8]],
  Z6a[[9]], Z6a[[11]], Z6a[[12]], Z6a[[13]], Z6a[[14]], Z6a[[10]], Z6a[[16]], Z6a[[17]], Z6a[[18]],
  Z6a[[19]], Z6a[[20]], Z6a[[21]], Z6a[[22]], Z6a[[23]], Z6a[[24]], Z6a[[25]], Z6a[[26]], Z6a[[27]],
  Z6a[[28]], Z6a[[29]], Z6a[[30]], Z6a[[31]], Z6a[[32]], Z6a[[33]], Z6a[[34]], Z6a[[35]], Z6a[[36]],
  Z6a[[37]], Z6a[[38]], Z6a[[39]], Z6a[[40]], Z6a[[41]] )
```

```
Z6c <- colSums(Z6b)
Erg6_F <- Z6c[15]
Erg6_F
```

#####7 Element

```
#Yts
Yts1 = NULL
for (i in country_list) {Yts1[[i]] = Y[ -(((i-1)*35+1):(35*i)), 10]}
Yts = NULL
for (i in country_list_preFRA) {Yts[[i]] = Yts1[[i]][ -(456:490) ]}
for (i in country_list_aftFRA) {Yts[[i]] = Yts1[[i]][ -(491:525) ]}
```

```
Z7 = NULL
for (i in country_list) {Z7[[i]] = Asr[[i]] %*% Brt[[i]] %*% Yts[[i]]}
for (i in country_list) {Z7[[i]] <- as.vector(Z7[[i]])}
```

```
Z7a = NULL
for (i in country_list) {Z7a[[i]] = VsLss[[i]] * Z7[[i]]}
```

```
Z7b <- rbind(Z7a[[1]], Z7a[[2]], Z7a[[3]], Z7a[[4]], Z7a[[5]], Z7a[[6]], Z7a[[7]], Z7a[[8]],
  Z7a[[9]], Z7a[[11]], Z7a[[12]], Z7a[[13]], Z7a[[14]], Z7a[[10]], Z7a[[16]], Z7a[[17]], Z7a[[18]],
  Z7a[[19]], Z7a[[20]], Z7a[[21]], Z7a[[22]], Z7a[[23]], Z7a[[24]], Z7a[[25]], Z7a[[26]], Z7a[[27]],
  Z7a[[28]], Z7a[[29]], Z7a[[30]], Z7a[[31]], Z7a[[32]], Z7a[[33]], Z7a[[34]], Z7a[[35]], Z7a[[36]],
  Z7a[[37]], Z7a[[38]], Z7a[[39]], Z7a[[40]], Z7a[[41]] )
```

```
Z7c <- colSums(Z7b)
Erg7_F <- Z7c[15]
Erg7_F
```

#####8 Element

```
#Yss
```

```
Yss= NULL
```

```
for (i in country_list) {Yss[[i]] = Y[491:525 , 15]}
```

```
#Brs
```

```
Brs = NULL
```

```
for (i in country_list) {Brs[[i]] = B[(((i-1)*35+1):(35*i)), (491:525)]}
```

```
Z8 = NULL
```

```
for (i in country_list) {Z8[[i]] = Asr[[i]] %*% Brs[[i]] %*% Yss[[i]]}
```

```
for (i in country_list) {Z8[[i]] <- as.vector(Z8[[i]])}
```

```
Z8a = NULL
```

```
for (i in country_list) {Z8a[[i]] = VsLss[[i]] * Z8[[i]]}
```

```
Z8b <- rbind(Z8a[[1]], Z8a[[2]], Z8a[[3]], Z8a[[4]], Z8a[[5]], Z8a[[6]], Z8a[[7]], Z8a[[8]],
  Z8a[[9]], Z8a[[11]], Z8a[[12]], Z8a[[13]], Z8a[[14]], Z8a[[10]], Z8a[[16]], Z8a[[17]], Z8a[[18]],
  Z8a[[19]], Z8a[[20]], Z8a[[21]], Z8a[[22]], Z8a[[23]], Z8a[[24]], Z8a[[25]], Z8a[[26]], Z8a[[27]],
  Z8a[[28]], Z8a[[29]], Z8a[[30]], Z8a[[31]], Z8a[[32]], Z8a[[33]], Z8a[[34]], Z8a[[35]], Z8a[[36]],
  Z8a[[37]], Z8a[[38]], Z8a[[39]], Z8a[[40]], Z8a[[41]] )
```

```
Z8c <- colSums(Z8b)
```

```
Erg8_F <- Z8c[15]
```

```
Erg8_F
```

#####9 Element

```
#Yst
```

```
Yst1 = NULL
```

```
for (i in country_list) {Yst1[[i]] = Y[(491:525) , -15]}
```

```
Yst = NULL
```

```
for (i in country_list) {Yst[[i]] = rowSums(Yst1[[i]])}
```

```
Z9 = NULL
```

```
for (i in country_list) {Z9[[i]] = Asr[[i]] %*% Brs[[i]] %*% Yst[[i]]}
```

```
for (i in country_list) {Z9[[i]] <- as.vector(Z9[[i]])}
```

```
Z9a = NULL
```

```
for (i in country_list) {Z9a[[i]] = VsLss[[i]] * Z9[[i]]}
```

```
Z9b <- rbind(Z9a[[1]], Z9a[[2]], Z9a[[3]], Z9a[[4]], Z9a[[5]], Z9a[[6]], Z9a[[7]], Z9a[[8]],
  Z9a[[9]], Z9a[[11]], Z9a[[12]], Z9a[[13]], Z9a[[14]], Z9a[[10]], Z9a[[16]], Z9a[[17]], Z9a[[18]],
  Z9a[[19]], Z9a[[20]], Z9a[[21]], Z9a[[22]], Z9a[[23]], Z9a[[24]], Z9a[[25]], Z9a[[26]], Z9a[[27]],
  Z9a[[28]], Z9a[[29]], Z9a[[30]], Z9a[[31]], Z9a[[32]], Z9a[[33]], Z9a[[34]], Z9a[[35]], Z9a[[36]],
  Z9a[[37]], Z9a[[38]], Z9a[[39]], Z9a[[40]], Z9a[[41]] )
```

```
Z9c <- colSums(Z9b)
Erg9_F <- Z9c[15]
Erg9_F
```

####10 Element

```
#Bss
Bss=NULL
for (i in country_list) {Bss[[i]] = B[491:525 , 491:525]}

VsBss = NULL
for (i in country_list) {VsBss[[i]] = Vs[[i]] %*% Bss[[i]}

Diff = NULL
for (i in country_list) {Diff[[i]] = VsBss[[i]] - VsLss[[i]}}
```

```
#X
X <- d.AVX[1437,]
X <- as.numeric(X)
Xr = NULL
for (i in country_list) {Xr[[i]] = X[(((i-1)*35+1):(35*i))]}
```

```
Z10 = NULL
for (i in country_list) {Z10[[i]] = Asr[[i]] %*% Xr[[i]}
for(i in country_list) {Z10[[i]] <- as.vector(Z10[[i])}
```

```
Z10a = NULL
for (i in country_list) {Z10a[[i]] = Diff[[i]] * Z10[[i]}}
```

```
Z10b <- rbind(Z10a[[1]], Z10a[[2]], Z10a[[3]], Z10a[[4]], Z10a[[5]], Z10a[[6]], Z10a[[7]],
  Z10a[[8]], Z10a[[9]], Z10a[[11]], Z10a[[12]], Z10a[[13]], Z10a[[14]], Z10a[[10]], Z10a[[16]],
  Z10a[[17]], Z10a[[18]], Z10a[[19]], Z10a[[20]], Z10a[[21]], Z10a[[22]], Z10a[[23]], Z10a[[24]],
  Z10a[[25]], Z10a[[26]], Z10a[[27]], Z10a[[28]], Z10a[[29]], Z10a[[30]], Z10a[[31]], Z10a[[32]],
  Z10a[[33]], Z10a[[34]], Z10a[[35]], Z10a[[36]], Z10a[[37]], Z10a[[38]], Z10a[[39]], Z10a[[40]],
  Z10a[[41]] )
```

```
Z10c <- colSums(Z10b)
Erg10_F <- Z10c[15]
Erg10_F
```

#####11 Element

```
#Vr
V <- as.vector(V)
V <- as.numeric(V)
Vr = NULL
for (i in country_list) {Vr[[i]] = V[((i-1)*35+1):(35*i)]}

#Ysr
Ysr=NULL
for (i in country_list) {Ysr[[i]] = Y[(491:525) , i]}

#VrBrs
VrBrs= NULL
for (i in country_list) {VrBrs[[i]] = Vr[[i]] %*% Brs[[i]]}

#Interim Result
Z11 = NULL
for (i in country_list) {Z11[[i]] = VrBrs[[i]] * Ysr[[i]]}
```

```
Z11a <- rbind(Z11[[1]], Z11[[2]], Z11[[3]], Z11[[4]], Z11[[5]], Z11[[6]], Z11[[7]], Z11[[8]],
  Z11[[9]], Z11[[11]], Z11[[12]], Z11[[13]], Z11[[14]], Z11[[10]], Z11[[16]], Z11[[17]], Z11[[18]],
  Z11[[19]], Z11[[20]], Z11[[21]], Z11[[22]], Z11[[23]], Z11[[24]], Z11[[25]], Z11[[26]], Z11[[27]],
  Z11[[28]], Z11[[29]], Z11[[30]], Z11[[31]], Z11[[32]], Z11[[33]], Z11[[34]], Z11[[35]], Z11[[36]],
  Z11[[37]], Z11[[38]], Z11[[39]], Z11[[40]], Z11[[41]] )
```

```
Z11b <- colSums(Z11a)
Erg11_F <- Z11b[15]
Erg11_F
```

#####12 Element

```
#Lrr
Arr=NULL
for (i in country_list) {Arr[[i]] = A[((i-1)*35+1):(35*i) , ((i-1)*35+1):(35*i) ]}
I <- diag(35)
IArr = NULL
for (i in country_list) {IArr[[i]] = I - Arr[[i]]}
Lrr = NULL
for (i in country_list) {Lrr[[i]] = solve(IArr[[i]])}
```

```
#Interim Result
Z12 = NULL
for (i in country_list) {Z12[[i]] = Asr[[i]] %*% Lrr[[i]] %*% Yrr[[i]]}
for (i in country_list) {Z12[[i]] <- as.vector(Z12[[i]])}
```

```
Z12a = NULL
for (i in country_list) {Z12a[[i]] = VrBrs[[i]] * Z12[[i]]}
```



```
Z12b <- rbind(Z12a[[1]], Z12a[[2]], Z12a[[3]], Z12a[[4]], Z12a[[5]], Z12a[[6]], Z12a[[7]],
  Z12a[[8]], Z12a[[9]], Z12a[[11]], Z12a[[12]], Z12a[[13]], Z12a[[14]], Z12a[[10]], Z12a[[16]],
  Z12a[[17]], Z12a[[18]], Z12a[[19]], Z12a[[20]], Z12a[[21]], Z12a[[22]], Z12a[[23]], Z12a[[24]],
  Z12a[[25]], Z12a[[26]], Z12a[[27]], Z12a[[28]], Z12a[[29]], Z12a[[30]], Z12a[[31]], Z12a[[32]],
  Z12a[[33]], Z12a[[34]], Z12a[[35]], Z12a[[36]], Z12a[[37]], Z12a[[38]], Z12a[[39]], Z12a[[40]],
  Z12a[[41]] )
```

```
Z12c <- colSums(Z12b)
Erg12_F <- Z12c[15]
Erg12_F
```

####13 Element

```
#EXr
```

```
EXr = NULL
```

```
for (i in country_list_woRoW) {EXr[[i]] = EX[,i]}
```

```
Z13 = NULL
```

```
for (i in country_list_woRoW) {Z13[[i]] = Asr[[i]] %*% Lrr[[i]] %*% EXr[[i]]}
```

```
for (i in country_list_woRoW) {Z13[[i]] <- as.vector(Z13[[i]])}
```

```
Z13a = NULL
```

```
for (i in country_list_woRoW) {Z13a[[i]] = VrBrs[[i]] * Z13[[i]]}
```

```
Z13b <- rbind(Z13a[[1]], Z13a[[2]], Z13a[[3]], Z13a[[4]], Z13a[[5]], Z13a[[6]], Z13a[[7]],
  Z13a[[8]], Z13a[[9]], Z13a[[11]], Z13a[[12]], Z13a[[13]], Z13a[[14]], Z13a[[10]], Z13a[[16]],
  Z13a[[17]], Z13a[[18]], Z13a[[19]], Z13a[[20]], Z13a[[21]], Z13a[[22]], Z13a[[23]], Z13a[[24]],
  Z13a[[25]], Z13a[[26]], Z13a[[27]], Z13a[[28]], Z13a[[29]], Z13a[[30]], Z13a[[31]], Z13a[[32]],
  Z13a[[33]], Z13a[[34]], Z13a[[35]], Z13a[[36]], Z13a[[37]], Z13a[[38]], Z13a[[39]], Z13a[[40]] )
```

```
Z13c <- colSums(Z13b)
Erg13_F <- Z13c[15]
Erg13_F
```

####14 Element

```
#Vt
```

```
V <- d.AVX[1436,]
```

```
V <- as.vector(V)
```

```
V <- as.numeric(V)
```

```
Vt1 = NULL
```

```
for (i in country_list_woFRA) { Vt1[[i]] = V[ -(((i-1)*35+1):(35*i)) ] }
```

```
Vt = NULL
```

```
for (i in country_list_preFRA) { Vt[[i]] = Vt1[[i]][-(456:490)]}
```

```
for (i in country_list_aftFRA) { Vt[[i]] = Vt1[[i]][-(491:525)]}
```

```
Vt[[i]] <- as.numeric(Vt[[i]])
```

```
for (i in country_list_woFRA) {Vt[[i]] = t(Vt[[i]])}
```

```

#Bts
B1 <- B[, (491:525)]
Bts1 = NULL
for (i in country_list) { Bts1[[i]] = B1[ -(((i-1)*35+1):(35*i)) , ] }
Bts = NULL
for (i in country_list_preFRA) { Bts[[i]] = Bts1[[i]][-(456:490), ]}
for (i in country_list_aftFRA) { Bts[[i]] = Bts1[[i]][-(491:525), ]}

#VtBts
VtBts = NULL
for (i in country_list_woFRA) {VtBts[[i]] = Vt[[i]] %*% Bts[[i]]}

Z14 = NULL
for (i in country_list_woFRA) {Z14[[i]] = VtBts[[i]] * Ysr[[i]]}

Z14a <- rbind(Z14[[1]], Z14[[2]], Z14[[3]], Z14[[4]], Z14[[5]], Z14[[6]], Z14[[7]], Z14[[8]],
  Z14[[9]], Z14[[11]], Z14[[12]], Z14[[13]], Z14[[14]], Z14[[10]], Z14[[16]], Z14[[17]], Z14[[18]],
  Z14[[19]], Z14[[20]], Z14[[21]], Z14[[22]], Z14[[23]], Z14[[24]], Z14[[25]], Z14[[26]], Z14[[27]],
  Z14[[28]], Z14[[29]], Z14[[30]], Z14[[31]], Z14[[32]], Z14[[33]], Z14[[34]], Z14[[35]], Z14[[36]],
  Z14[[37]], Z14[[38]], Z14[[39]], Z14[[40]], Z14[[41]] )

Z14b <- colSums(Z14a)
Erg14_F <- Z14b[15]
Erg14_F

#####15 Element

Z15 = NULL
for (i in country_list) {Z15[[i]] = Asr[[i]] %*% Lrr[[i]] %*% Yrr[[i]]}
for (i in country_list) {Z15[[i]] <- as.vector(Z15[[i]])}

Z15a = NULL
for (i in country_list_woFRA) {Z15a[[i]] = VtBts[[i]] * Z15[[i]]}

Z15b <- rbind(Z15a[[1]], Z15a[[2]], Z15a[[3]], Z15a[[4]], Z15a[[5]], Z15a[[6]], Z15a[[7]],
  Z15a[[8]], Z15a[[9]], Z15a[[11]], Z15a[[12]], Z15a[[13]], Z15a[[14]], Z15a[[10]], Z15a[[16]],
  Z15a[[17]], Z15a[[18]], Z15a[[19]], Z15a[[20]], Z15a[[21]], Z15a[[22]], Z15a[[23]], Z15a[[24]],
  Z15a[[25]], Z15a[[26]], Z15a[[27]], Z15a[[28]], Z15a[[29]], Z15a[[30]], Z15a[[31]], Z15a[[32]],
  Z15a[[33]], Z15a[[34]], Z15a[[35]], Z15a[[36]], Z15a[[37]], Z15a[[38]], Z15a[[39]], Z15a[[40]],
  Z15a[[41]] )

Z15c <- colSums(Z15b)
Erg15_F <- Z15c[15]
Erg15_F

```

####16 Element

```
Z16 = NULL
```

```
for (i in country_list_woRoW) {Z16[[i]] = Asr[[i]] %*% Lrr[[i]] %*% EXr[[i]]}
```

```
for (i in country_list_woRoW) {Z16[[i]] <- as.vector(Z16[[i]])}
```

```
Z16a = NULL
```

```
for (i in country_list_woRoW) {Z16a[[i]] = VtBts[[i]] * Z16[[i]]}
```

```
Z16b <- rbind(Z16a[[1]], Z16a[[2]], Z16a[[3]], Z16a[[4]], Z16a[[5]], Z16a[[6]], Z16a[[7]],  
  Z16a[[8]], Z16a[[9]], Z16a[[11]], Z16a[[12]], Z16a[[13]], Z16a[[14]], Z16a[[10]], Z16a[[16]],  
  Z16a[[17]], Z16a[[18]], Z16a[[19]], Z16a[[20]], Z16a[[21]], Z16a[[22]], Z16a[[23]], Z16a[[24]],  
  Z16a[[25]], Z16a[[26]], Z16a[[27]], Z16a[[28]], Z16a[[29]], Z16a[[30]], Z16a[[31]], Z16a[[32]],  
  Z16a[[33]], Z16a[[34]], Z16a[[35]], Z16a[[36]], Z16a[[37]], Z16a[[38]], Z16a[[39]], Z16a[[40]])
```

```
Z16c <- colSums(Z16b)
```

```
Erg16_F <- Z16c[15]
```

```
Erg16_F
```

####Exporting data

```
res <- data.frame(Erg1_F, Erg2_F, Erg3_F, Erg4_F, Erg5_F, Erg6_F, Erg7_F, Erg8_F, Erg9_F,  
  Erg10_F, Erg11_F, Erg12_F, Erg13_F, Erg14_F, Erg15_F, Erg16_F)
```

```
write.csv(res, file = "resFRA_11.csv")
```

```
rm(d.AVX, d.Y, d.EX, d.A, res)
```