Lab 2 - Solution

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Using pksfc

To show how to use the package PKSFC, we will see the various step used in the lecture to update the model PC. First we need to load the package

```
library(PKSFC)
```

Then, you need to download the two attached 'SIM.txt' and 'SIMEX.txt' file and save it in the folder of your choice. Make sure to set the working directory where you saved the downloaded file. In command line this looks like this but if you use Rstudio, you can use the graphical interface as well (Session>Set Working Directory>Choose Directory)

```
setwd("pathToYourDirectory")
```

Loading the model

The first thing to do is to load the model and check for completeness.

```
pcex<-sfc.model("Models/PCEX.txt",modelName="Portfolio Choice Model")
pcex<-sfc.check(pcex,fill=FALSE)
```

We are now ready to simulate the model

```
datapcex<-simulate(pcex)
```

Adding the Maastricht treaty: 1 Rational Government

```
#Computing the targeted tax rate
init <- as.data.frame(t(datapcex$baseline[66,]))
alpha1<-init$alpha1
alpha2<-init$alpha2
alpha<-(1-alpha1)/alpha2
r<-init$r
lambda0<-init$lambda0
lambda1<-init$lambda1
lambda2<-init$lambda2
lambda<-lambda0+lambda1*r
M<-0.6
newTheta <- (alpha/M+r*(lambda*alpha-lambda2)-1)/(alpha/M+r*(lambda*alpha-lambda2))
```

Adding a scenario

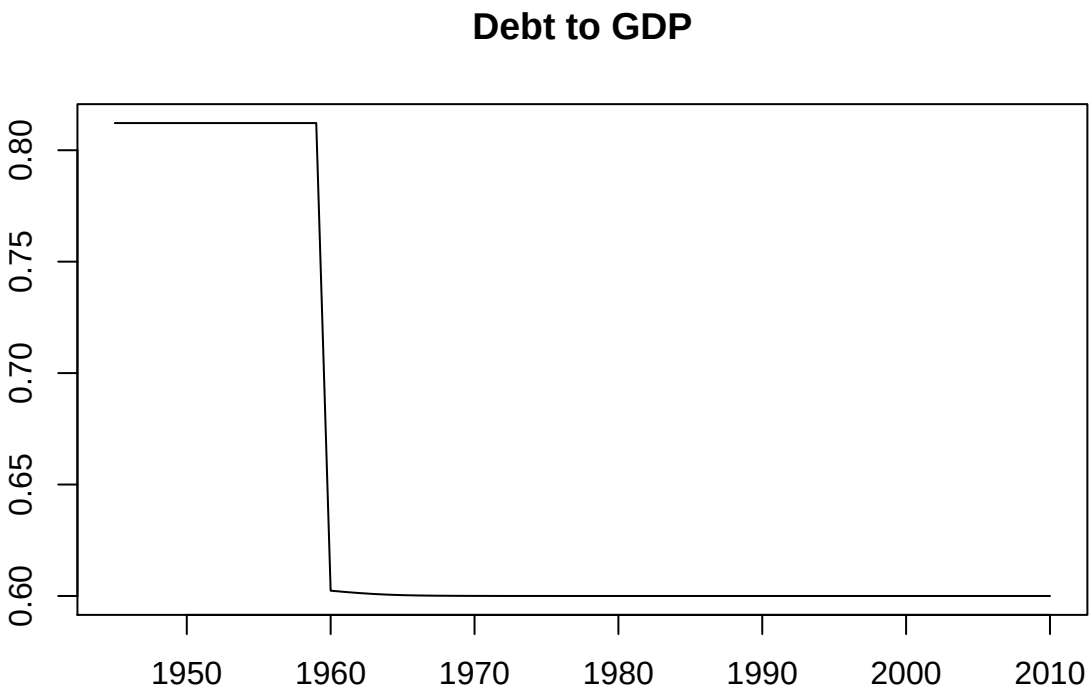
Changing the value of the tax rate to its optimal value

```
pcex<-sfc.addScenario(pcex,c("theta"),c(newTheta),c(1960),c(2010),init)
#Simulation
datapcex<-simulate(pcex)
```

Doing some plots

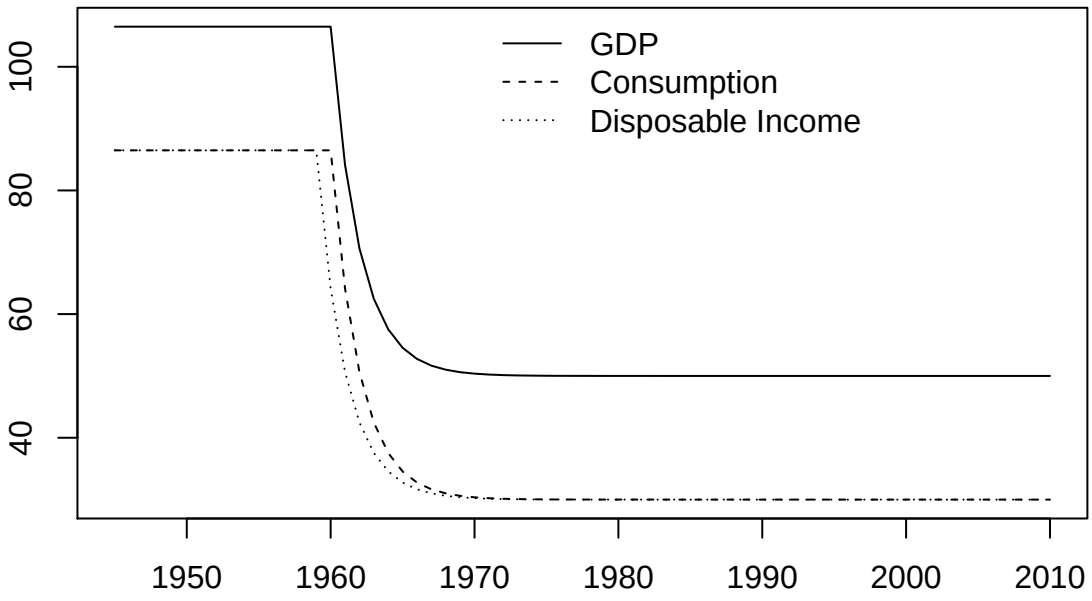
1. debt to gdp

```
#Plots the results
plot(pcex$time,datapcex$scenario_1[,"v"]/datapcex$scenario_1[,"y"],
    type="l",xlab="",ylab="",xlim=range(pcex$time),main="Debt to GDP")
```



2. gdp, consumption and disposable income

```
plot(pcex$time,datapcex$scenario_1[,"y"],type="l",xlab="",ylab="",
    xlim=range(pcex$time),ylim=range(datapcex$scenario_1[,c("cons","yd","y")],na.rm=T))
lines(pcex$time,datapcex$scenario_1[,"cons"],lty=2)
lines(pcex$time,datapcex$scenario_1[,"yd"],lty=3)
legend(x=1970,y=110,legend=c("GDP","Consumption","Disposable Income"),lty=c(1,2,3),bty="n")
```



A (somewhat) Rational Government

Updating the model to a growth government expenditure model

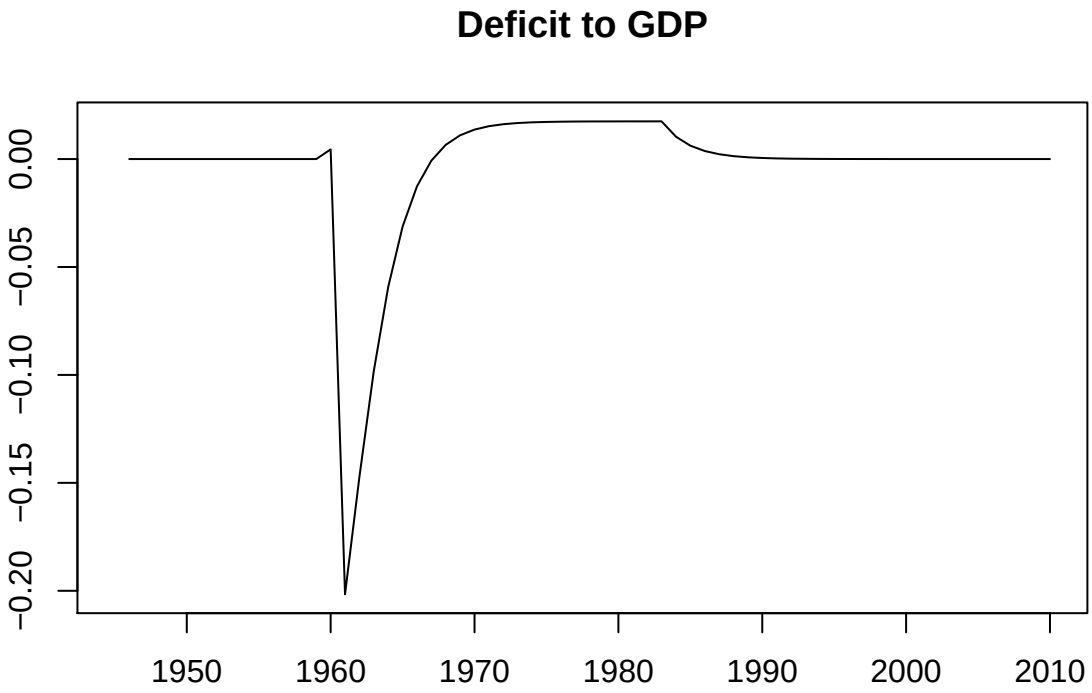
```
pcexgr<-sfc.addEqu(pcex,"g","g(-1)*(1+grg)","government expenditures")
pcexgr<-sfc.editVar(pcexgr,var="theta",init=newTheta)
pcexgr<-sfc.addVar(pcexgr,var="grg",init=0,desc="Government expenditure growth")
pcexgr$scenarios<-NULL
pcexgr<-sfc.addScenario(pcexgr,list(c("grg")),list(c(0.03)),1960,1982,init)
pcexgr<-sfc.check(pcexgr)


#Simulation
datapcex2<-simulate(pcexgr)
```

Plots the results

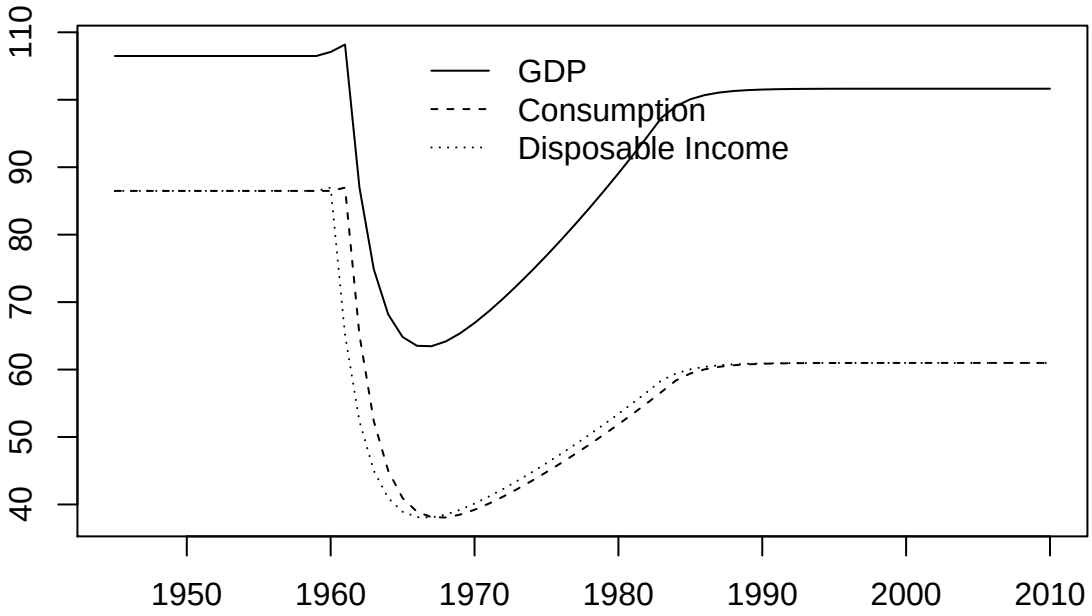
1. Deficit to GDP

```
plot(pcexgr$time[2:66],(datapcex2$scenario_1[2:66,"v"]-datapcex2$scenario_1[1:65,"v"])
        /datapcex2$scenario_1[2:66,"y"],type="l",xlab="",ylab="",
        xlim=range(pcexgr$time),main="Deficit to GDP")
```



2. gdp, consumption and disposable income

```
plot(pcexgr$time,datapcex2$scenario_1[,"y"],type="l",xlab="",ylab="",
    xlim=range(pcexgr$time),ylim=range(datapcex2$scenario_1[,c("cons","yd","y")],na.rm=T))
lines(pcexgr$time,datapcex2$scenario_1[,"cons"],lty=2)
lines(pcexgr$time,datapcex2$scenario_1[,"yd"],lty=3)
legend(x=1965,y=110,legend=c("GDP","Consumption","Disposable Income"),lty=c(1,2,3),bty="n")
```



A (more) Rational Government

Updating the model to endogenous tax rate model

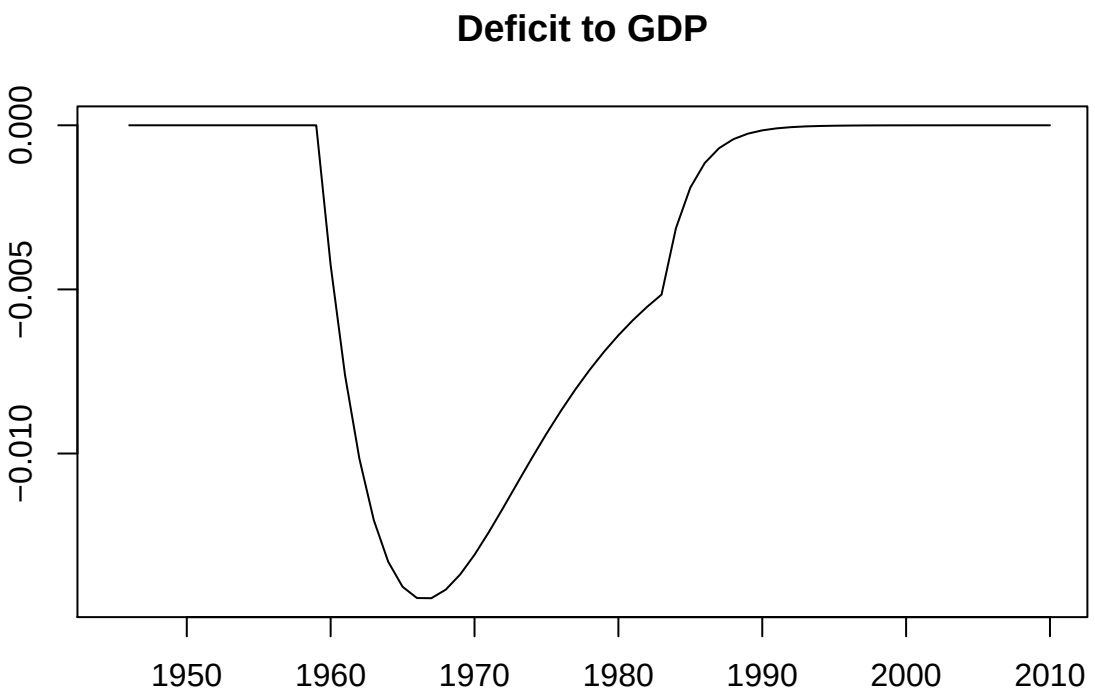
```
theta<-0.2
pcexgr2<-sfc.addEqu(pcex,"g","g(-1)*(1+grg)","government expenditures")
pcexgr2<-sfc.addEqu(pcexgr2,"theta","theta(-1)+dtheta","Tax rate")
pcexgr2<-sfc.addVar(pcexgr2,var="grg",init=0,desc="Government expenditure growth")
pcexgr2<-sfc.addVar(pcexgr2,var="dtheta",init=0,desc="Tax rate variation")
pcexgr2$scenarios<-NULL
pcexgr2<-sfc.addScenario(pcexgr2,list(c("grg","dtheta")),list(c(0.03,(newTheta-theta)/24))
                    ,1960,1982,init)
pcexgr2<-sfc.check(pcexgr2)

#Simulation
datapcex3<-simulate(pcexgr2)
```

Plots the results

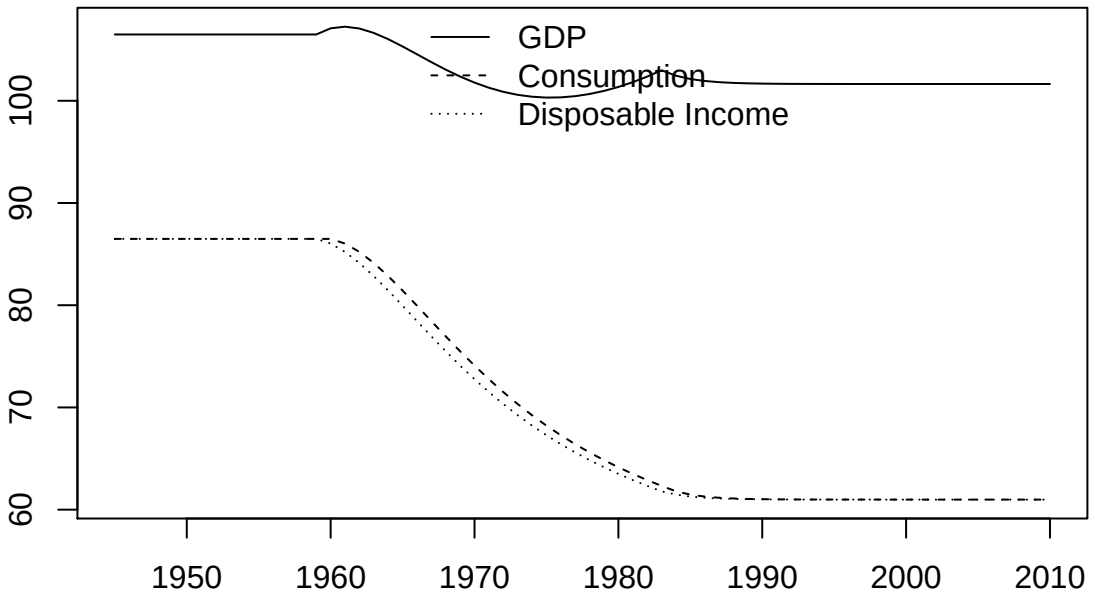
1. Deficit to GDP

```
plot(pcexgr$time[2:66],(datapcex3$scenario_1[2:66,"v"]-datapcex3$scenario_1[1:65,"v"])
        /datapcex3$scenario_1[2:66,"y"],type="l",xlab="",ylab="",xlim=range(pcexgr$time),
        main="Deficit to GDP")
```



2. gdp, consumption and disposable income

```
plot(pcexgr$time,datapcex3$scenario_1[,"y"],type="l",xlab="",ylab="",
    xlim=range(pcexgr$time),ylim=range(datapcex3$scenario_1[,c("cons","yd","y")],na.rm=T))
lines(pcexgr$time,datapcex3$scenario_1[,"cons"],lty=2)
lines(pcexgr$time,datapcex3$scenario_1[,"yd"],lty=3)
legend(x=1965,y=110,legend=c("GDP","Consumption","Disposable Income"),lty=c(1,2,3),bty="n")
```


GDP
Consumption
Disposable Income
100
90
80
70
60
1950
1960
1970
1980
1990
2000
2010