Functional-coefficient regression model of resource curse

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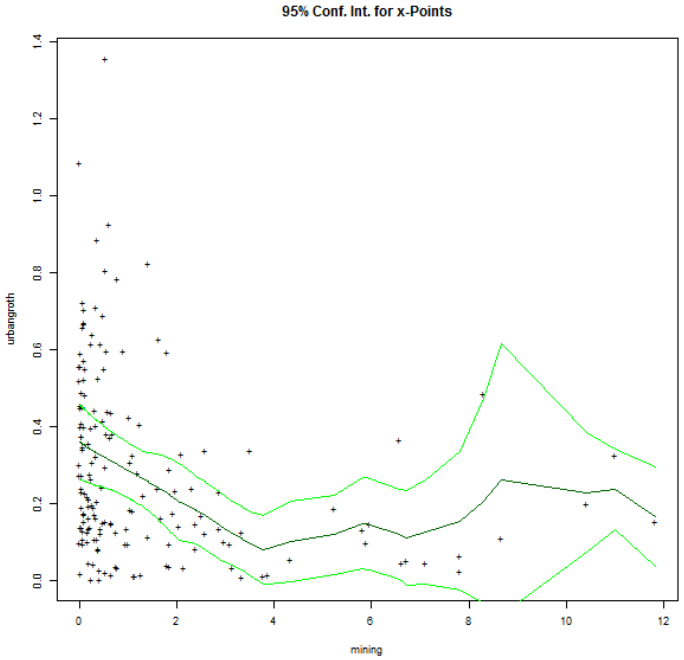
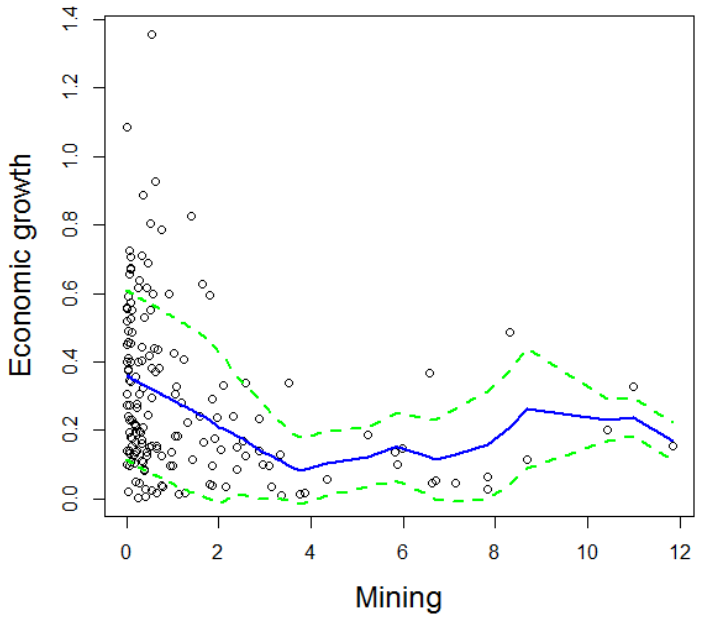
1st step

- library(locpol)
- city =read.csv("d:/github/Research/visualization/city3.csv")
- c1 = locpol(urbangroth~mining, city, xeval= city$mining)
- dim(c1$lpFit)

plot(c1), OR reproduce it by hand:

```
d = data.frame(city$mining, city$urbangroth)
plot(d, type = "p", xlab = "Mining", ylab = "Economic growth", cex.lab=1.5)
points(c1$lpFit[,c1$X],c1$lpFit[,c1$Y],type="l",lwd = 2, col="blue")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]+ sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]- sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
```

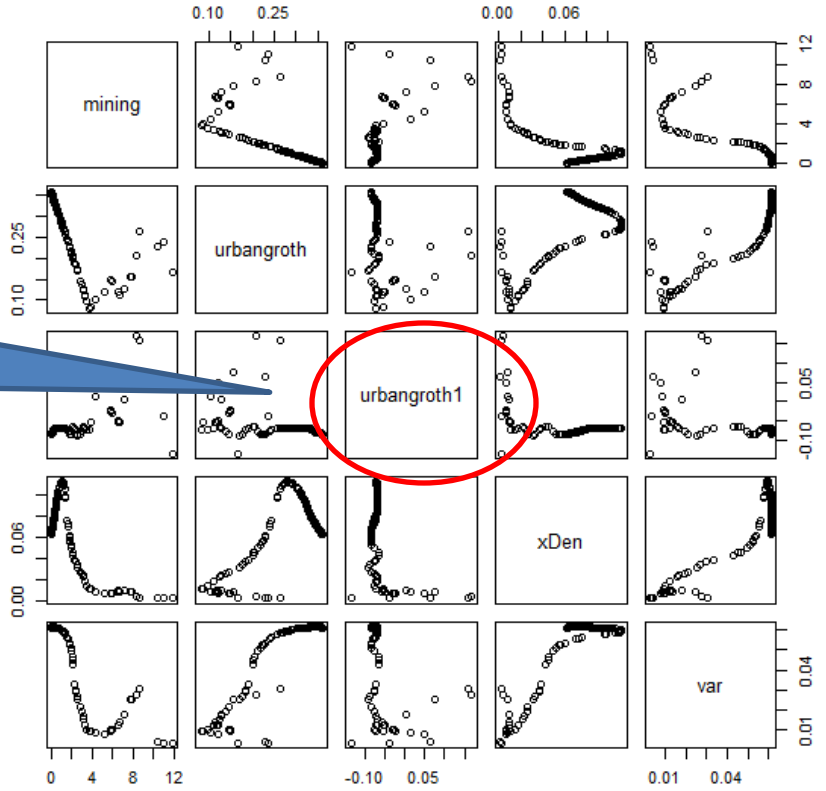




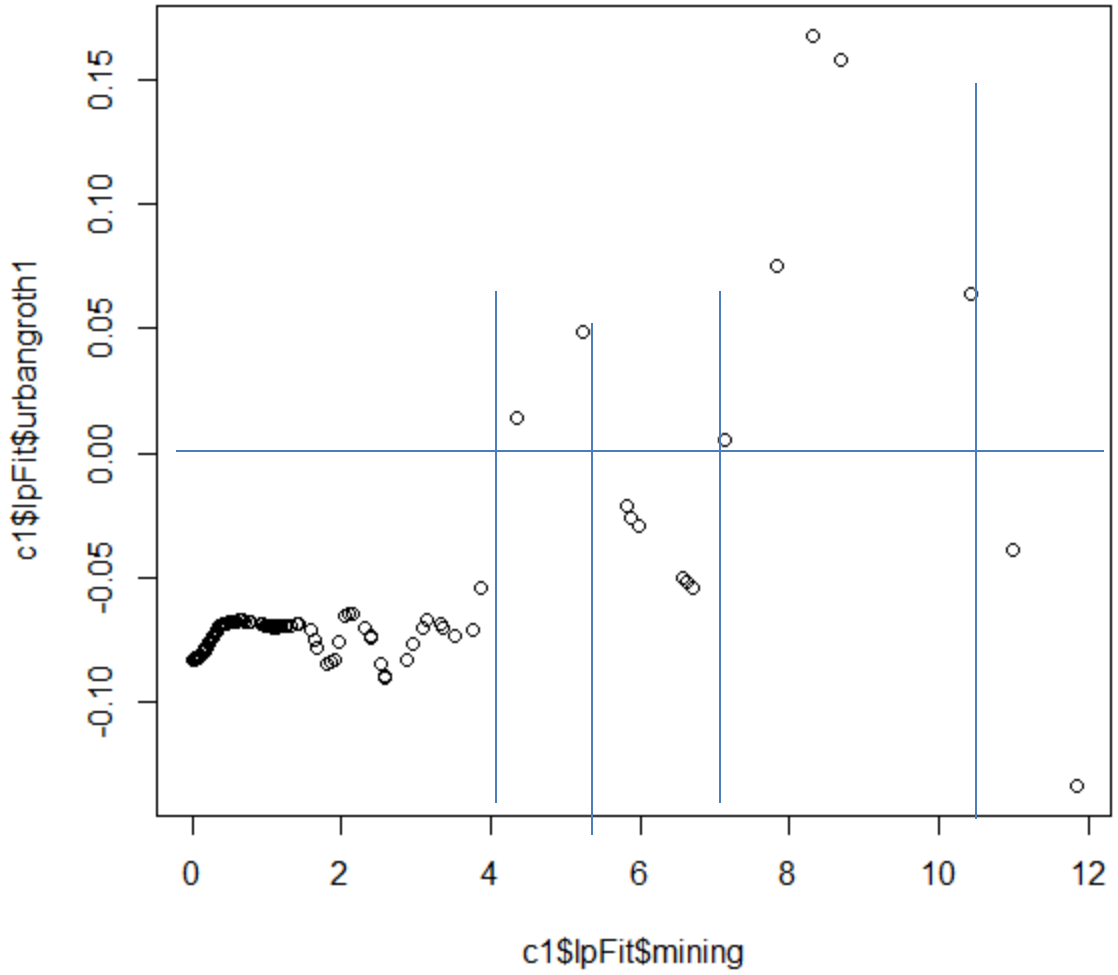
Summary(c1)

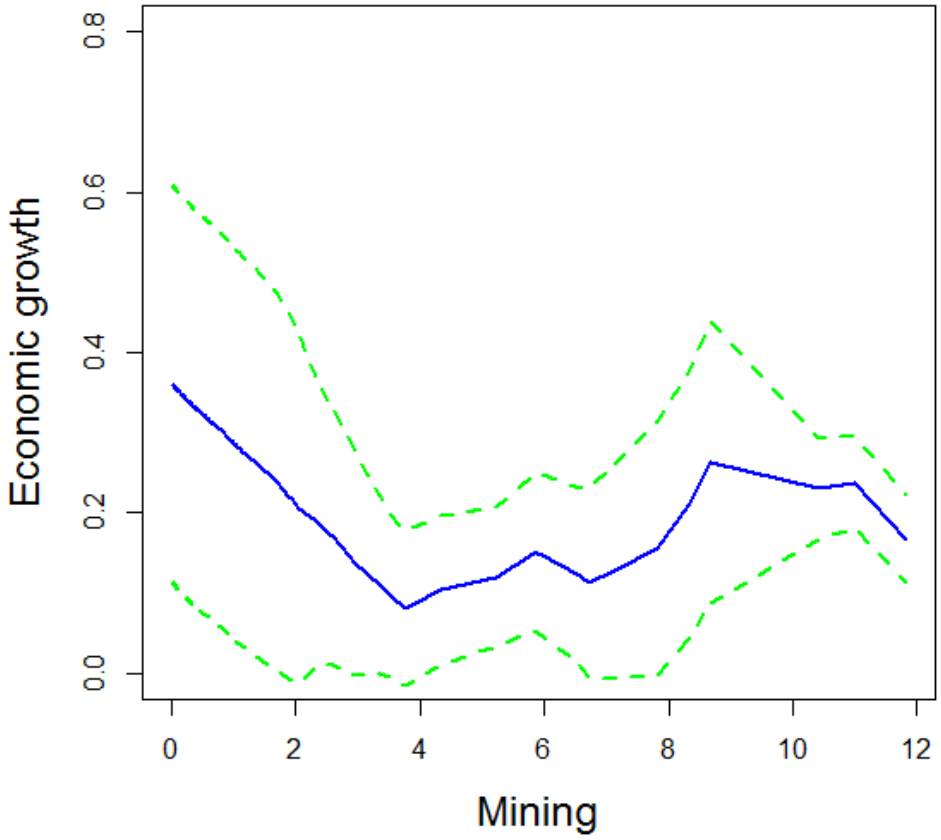
```
> summary(c1)
Kernel =  ifelse(abs(x) <= 1, 3/4 * (1 - x^2), 0)
n deg      bw       ase
167   1 1.499942 0.04984723
```

Get the 1st derivative as the Coefficient



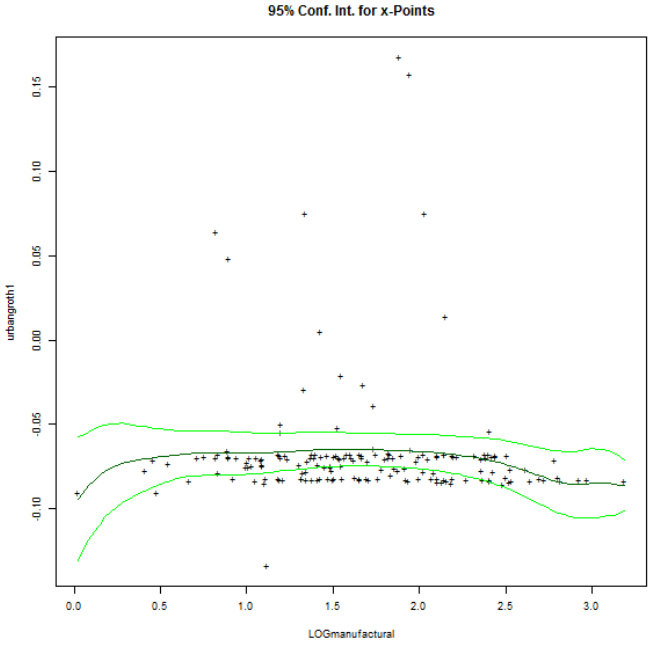
The 1st derivative of Y: Urban_growth

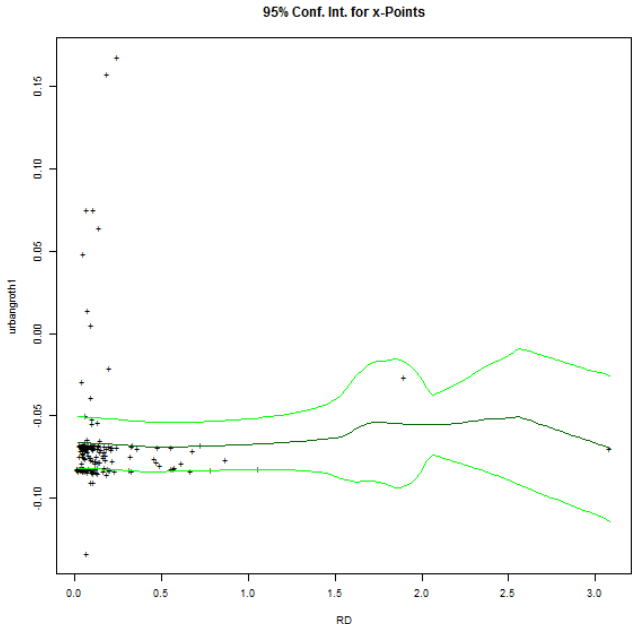


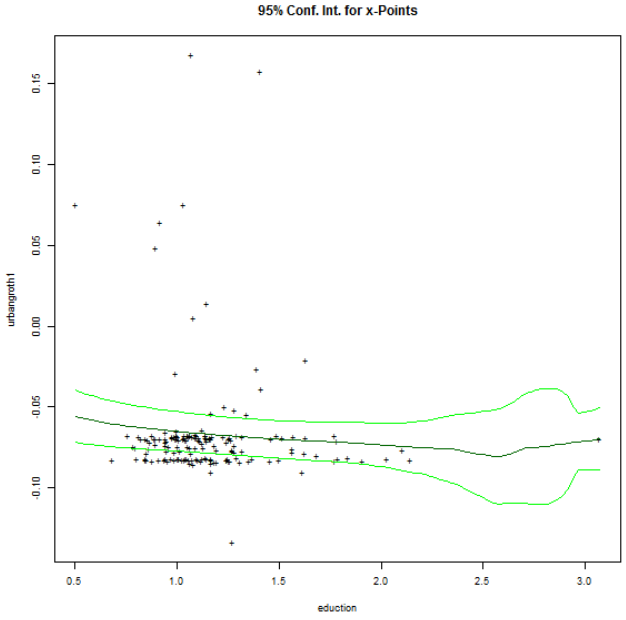

Economic growth
0.0
0.2
0.4
0.6
0.8
0
2
4
6
8
10
12
Mining

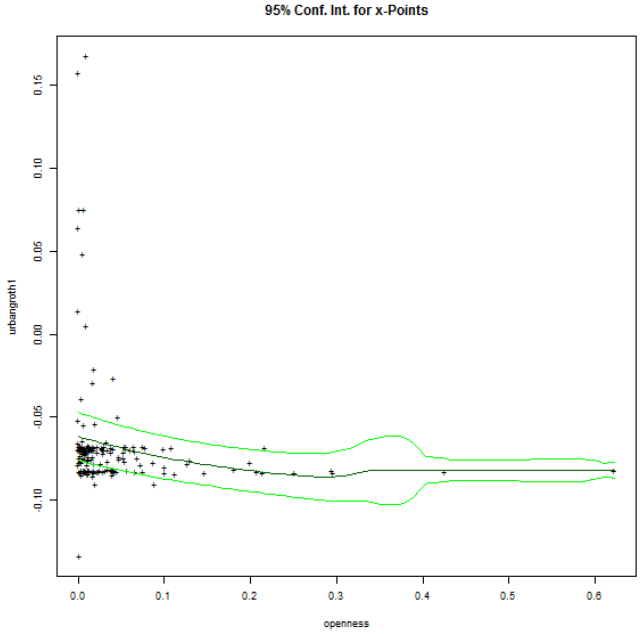
2nd Step

```
orderId = order(city$mining)
city2 = city[with(city, orderId), ]
city2 = data.frame(city2, c1$lpFit)
city2$LOGmanufactural = log(city2$manufactural)

c21 = locpol(urbangroth1~LOGmanufactural, city2)
c22 = locpol(urbangroth1~RD, city2)
c23 = locpol(urbangroth1~eduction, city2)
c24 = locpol(urbangroth1~openness, city2)
```


95% Conf. Int. for x-Points
urbangroth1
LOGmanufactural


95% Conf. Int. for x-Points
urbangroth1
RD


95% Conf. Int. for x-Points
urbangroth1
eduction


95% Conf. Int. for x-Points
urbangroth1
openness

New Plot 1

```
# plot 22
c21 = c22
c1 = c22

maxY = max(  c21$lpFit[,c21$Y]+ sqrt(c21$lpFit$var)  )
minY = min(  c21$lpFit[,c21$Y]- sqrt(c21$lpFit$var)  )

plot(city2$urbangroth1~city2$RD, # Change here
     type = "n", xlab = "R&D", # Change here
       ylab = "Coefficient", main = "Economic growth", cex.lab=1.5, cex.main = 2, cex.axis = 1.5,
     ylim = c(minY, maxY )    )
points(c1$lpFit[,c1$X],c1$lpFit[,c1$Y],type="l",lwd = 2, col="blue")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]+ sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]- sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
```

New Plot 2

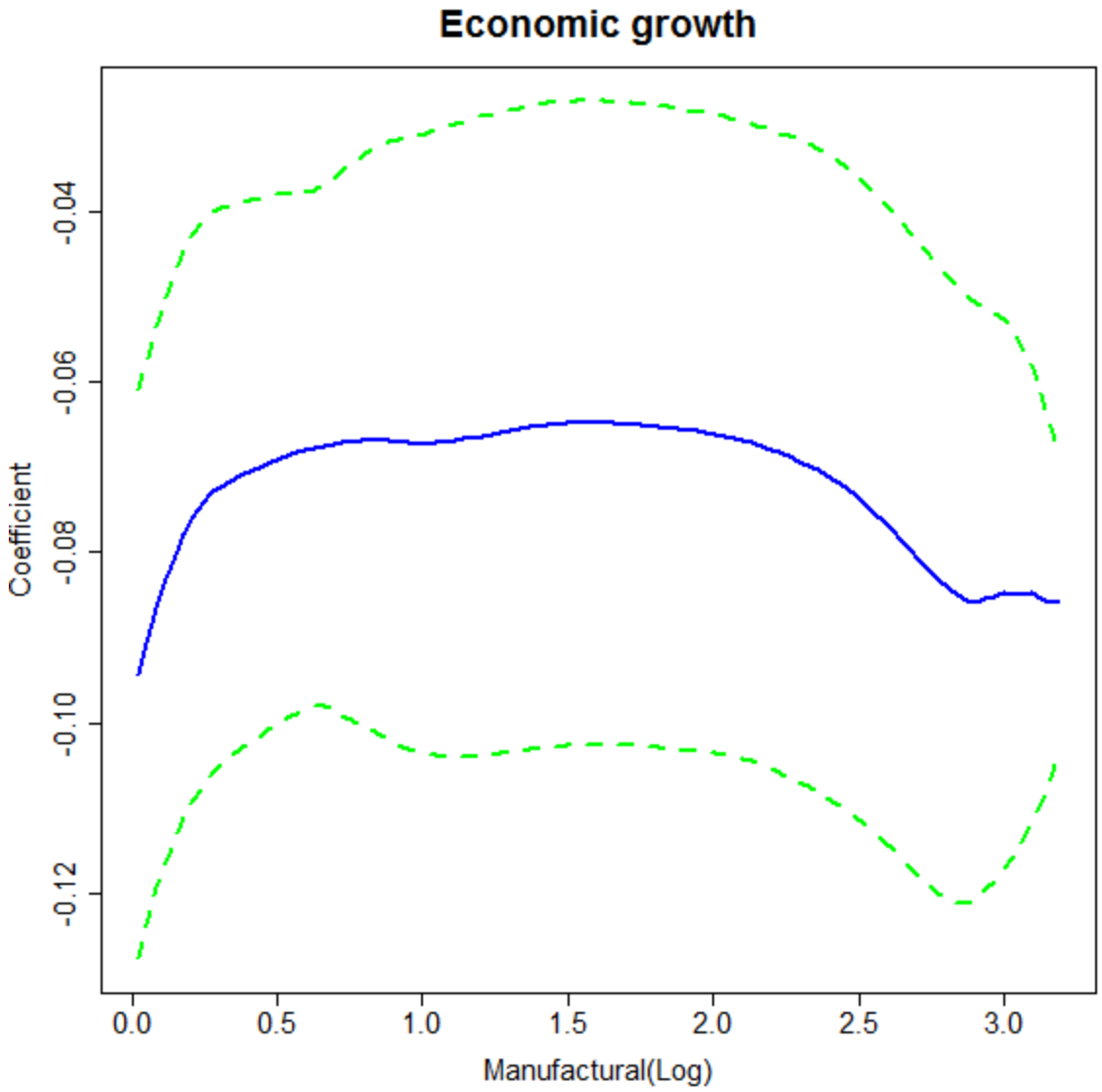
```
# plot 21
maxY = max(  c21$lpFit[,c21$Y]+ sqrt(c21$lpFit$var)  )
minY = min(  c21$lpFit[,c21$Y]- sqrt(c21$lpFit$var)  )

plot(city2$urbangroth1~city2$LOGmanufactural, # Change here
     type = "n", xlab = "Manufactural(Log)", # Change here
     ylab = "Coefficient", main = "Economic growth", cex.lab=1.5, cex.main = 2,
     cex.axis = 1.5,
     ylim = c(minY, maxY )    )
c1 = c21 # change here
points(c1$lpFit[,c1$X],c1$lpFit[,c1$Y],type="l",lwd = 2, col="blue")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]+ sqrt(c1$lpFit$var),type="l",lty = 2,lwd =
     2, col="green")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]- sqrt(c1$lpFit$var),type="l",lty = 2,lwd =
     2, col="green")
```

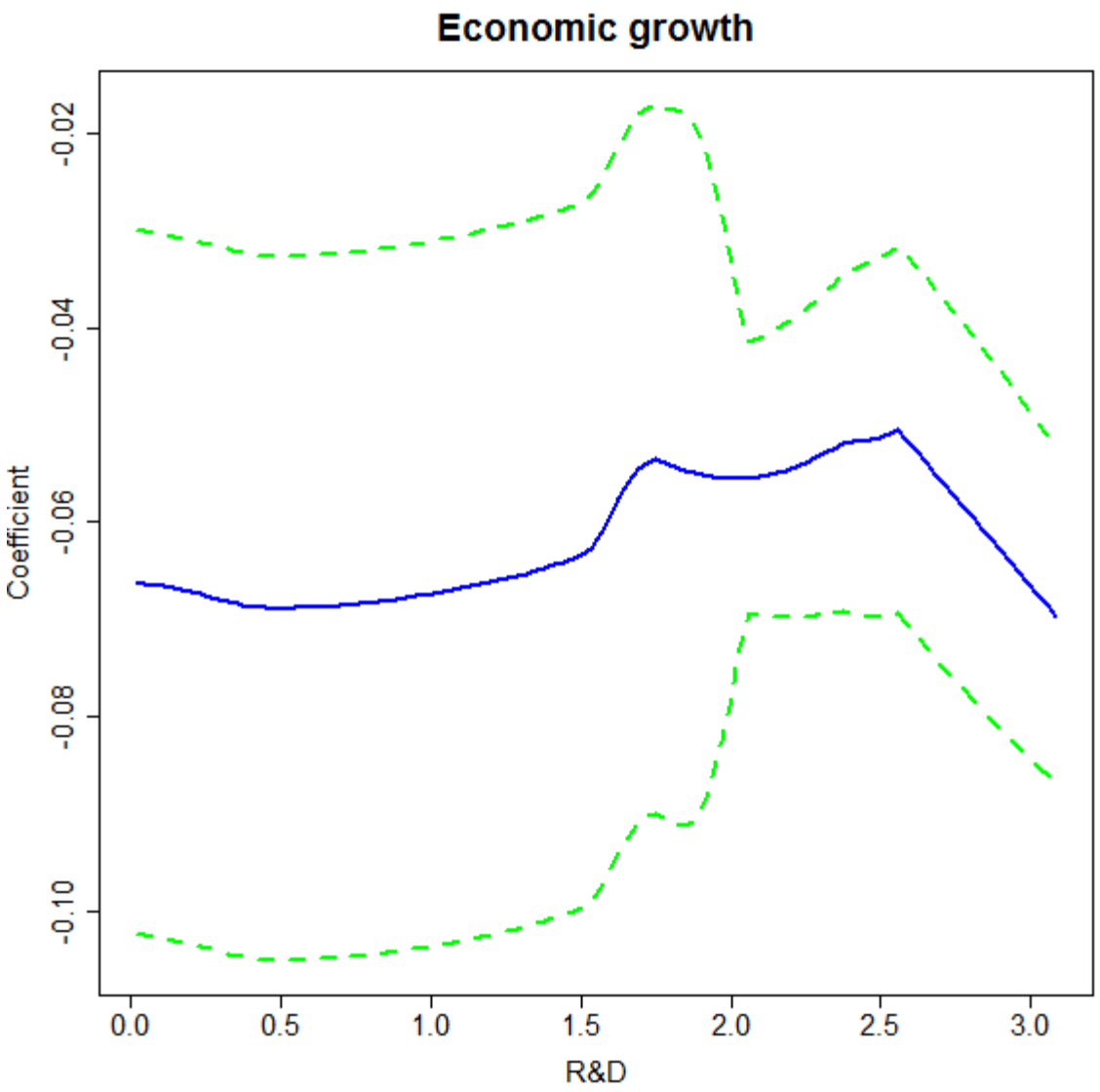
New Plot 3

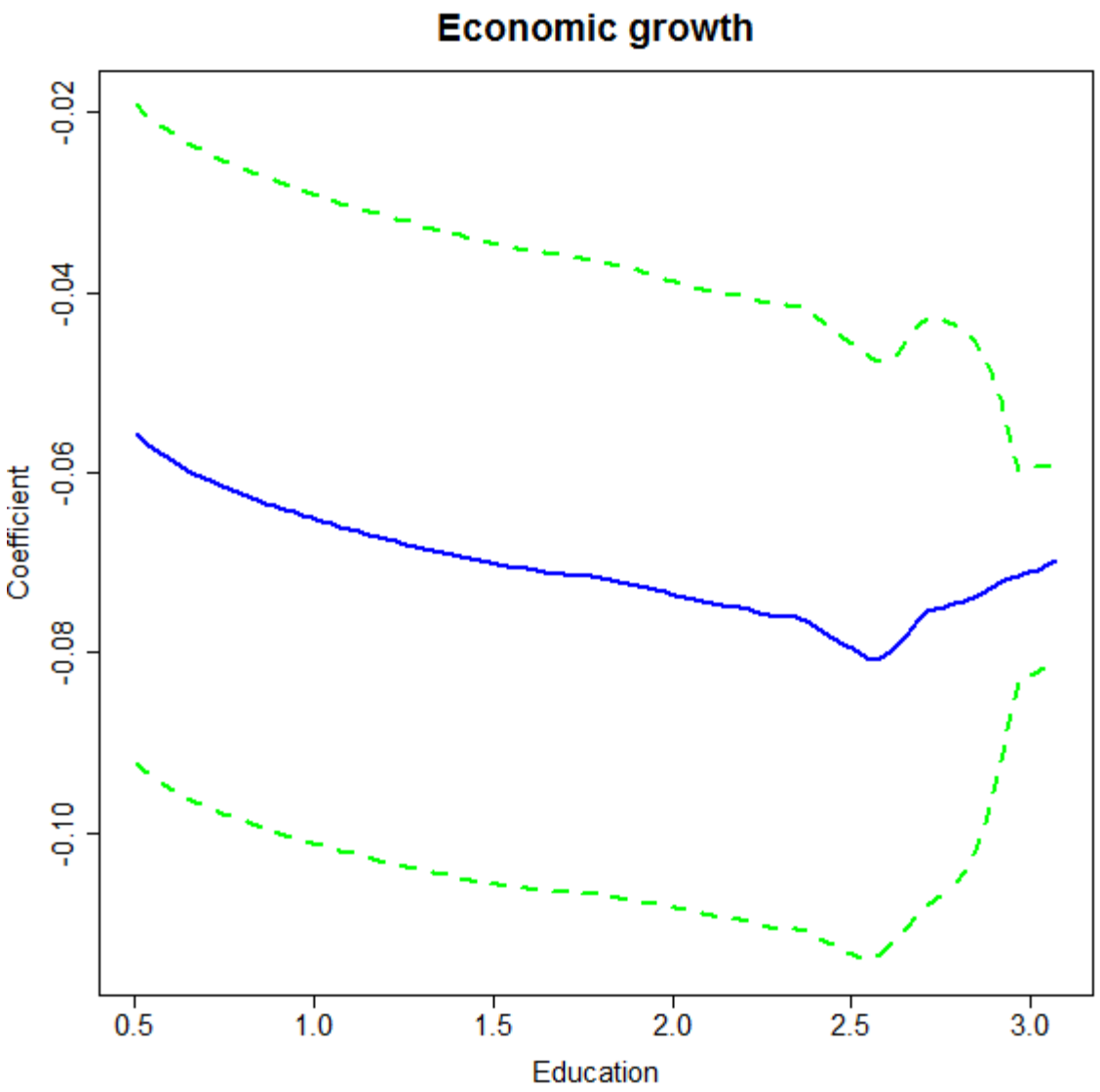
```
# plot 24
c21 = c24
c1 = c24

maxY = max(  c21$lpFit[,c21$Y]+ sqrt(c21$lpFit$var)  )
minY = min(  c21$lpFit[,c21$Y]- sqrt(c21$lpFit$var)  )

plot(city2$urbangroth1~city2$openness, # Change here
     type = "n", xlab = "Openness", # Change here
       ylab = "Coefficient", main = "Economic growth", cex.lab=1.5, cex.main = 2, cex.axis = 1.5,
     ylim = c(minY, maxY )    )
points(c1$lpFit[,c1$X],c1$lpFit[,c1$Y],type="l",lwd = 2, col="blue")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]+ sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]- sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
```

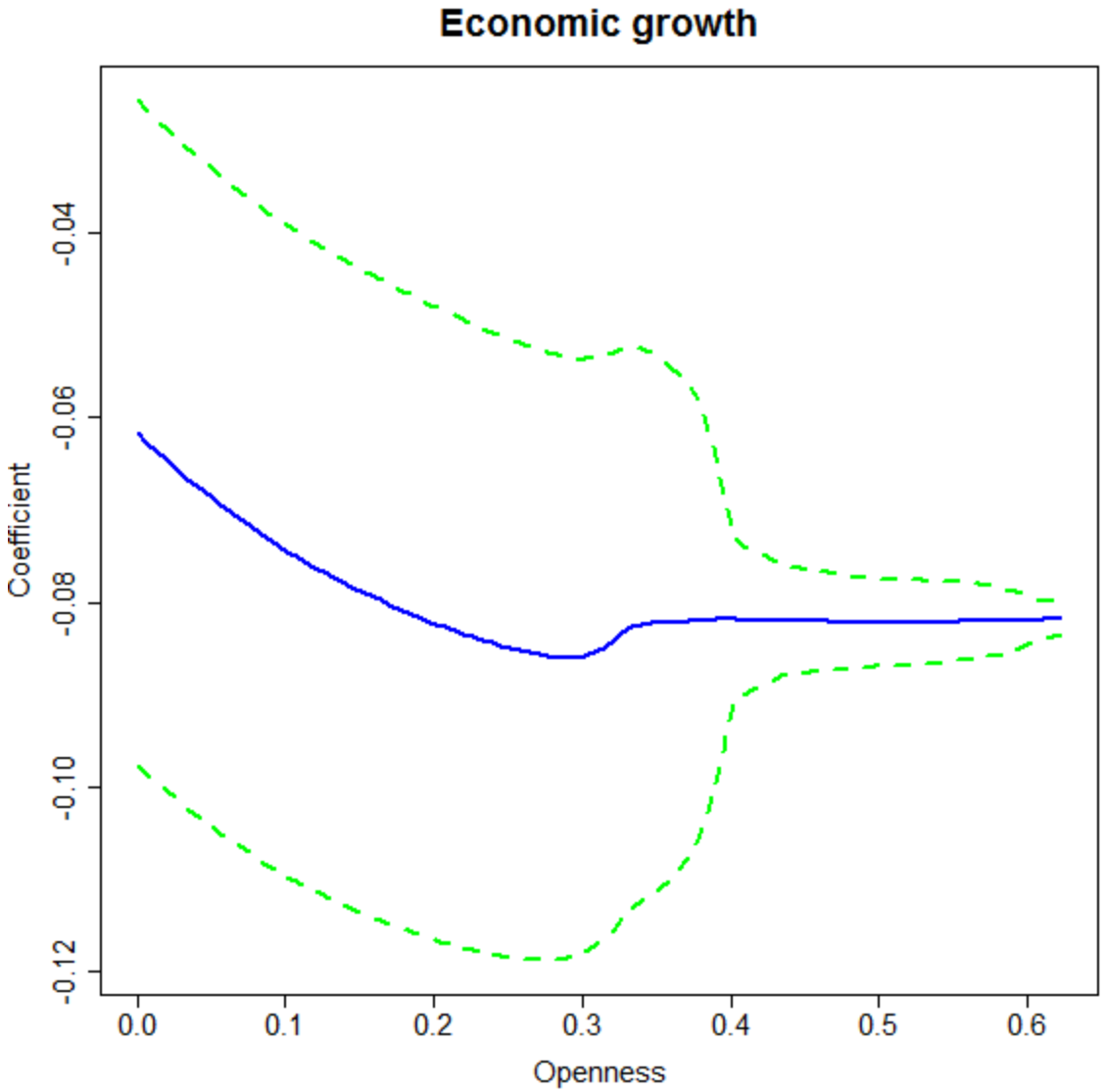
New Plot 4

```
# plot 23
c21 = c23
c1 = c23

maxY = max(  c21$lpFit[,c21$Y]+ sqrt(c21$lpFit$var)  )
minY = min(  c21$lpFit[,c21$Y]- sqrt(c21$lpFit$var)  )

plot(city2$urbangroth1~city2$eduction, # Change here
     type = "n", xlab = "Education", # Change here
       ylab = "Coefficient", main = "Economic growth", cex.lab=1.5, cex.main = 2, cex.axis = 1.5,
     ylim = c(minY, maxY )    )
points(c1$lpFit[,c1$X],c1$lpFit[,c1$Y],type="l",lwd = 2, col="blue")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]+ sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
lines(c1$lpFit[,c1$X],c1$lpFit[,c1$Y]- sqrt(c1$lpFit$var),type="l",lty = 2,lwd = 2, col="green")
```


Economic growth
Coefficient
-0.04
-0.06
-0.08
-0.10
-0.12
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Manufactural(Log)


Economic growth
Coefficient
-0.02
-0.04
-0.06
-0.08
-0.10
0.0
0.5
1.0
1.5
2.0
2.5
3.0
R&D


Economic growth
Coefficient
-0.02
-0.04
-0.06
-0.08
-0.10
0.5
1.0
1.5
2.0
2.5
3.0
Education


Economic growth
Coefficient
-0.04
-0.06
-0.08
-0.10
-0.12
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Openness