# Curso de Macroeconometria

*Resolução da Lista 10*

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22 de Dezembro de 2017

## Resolução dos Exercícios

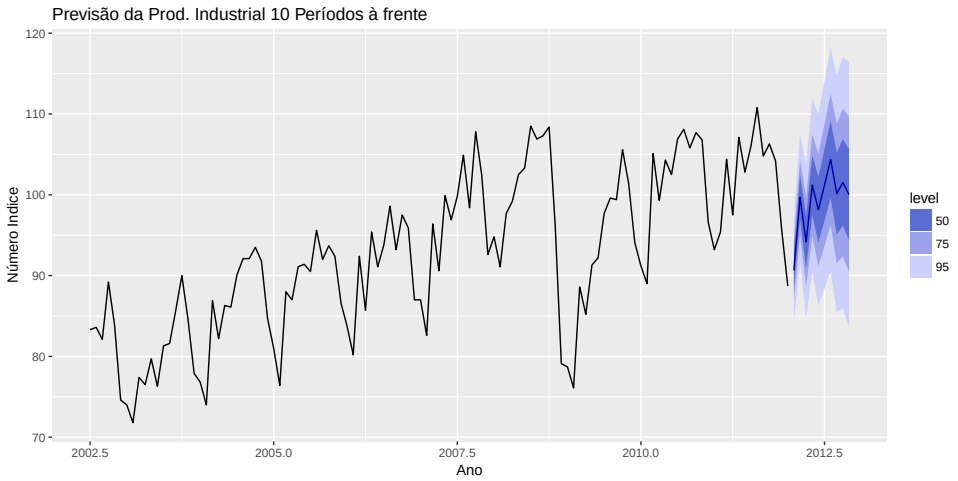
```
library(forecast)
library(urca)
library(stargazer)
library(png)
library(xtable)
library(mFilter)
library(ggplot2)
library(xtable)

#1.
pi.mens <- 0
pi.inter <- 0
pi.an2 <- 0
setwd( "C:/Users/rodney/Documents/Macroeconometria/Aula10")
data <- ts(read.csv('data.csv', header=T, sep=';', dec=',',
skip=4)[-183,-1], start=c(2002,01), freq=12)
colnames(data) <- c('pim', 'pim_sa')
# Variação mensal
for (x in 2:length(data[,1])){
pi.mens[x] <- 100*(data[x,1]-data[x-1,1])/data[x-1,1]}
pi.mens <- ts(pi.mens,start=c(2002,02), freq=12)
# Variação Interanual
for (x in 12:length(data[,1])){
pi.inter[x-11] <- 100*(data[x,1]-data[x-11,1])/data[x-11,1]
}
pi.inter <- ts(pi.inter,start=c(2003,01), freq=12)
# Variação Anual
pi.an <- aggregate.ts(data[,1],by= 12,FUN=sum)
for (x in 2:(length(pi.an))){
pi.an2[x-1] <- 100*(pi.an[x]-pi.an[x-1])/pi.an[x-1]
}
pi.an2 <- ts(pi.an2,start=c(2003), freq=1)

#2.
# Modelo Arima
mpim <- auto.arima(data[,1])
mpimsa <- auto.arima(data[,2])
data.model <- window(data,start=c(2002,07),end=c(2012,01))
```

```
data.forecast <- window(data, start=c(2012,02))
modelo <- Arima(data.model[,1], order=c(1,1,0), seasonal=c(2,0,0))
fmodelo <- forecast(modelo, h=nrow(data.forecast),
level=c(50,75,95))
accuracy1 <- accuracy(fmodelo, data.forecast[,1])
stargazer(accuracy1)
```

Tabela 1

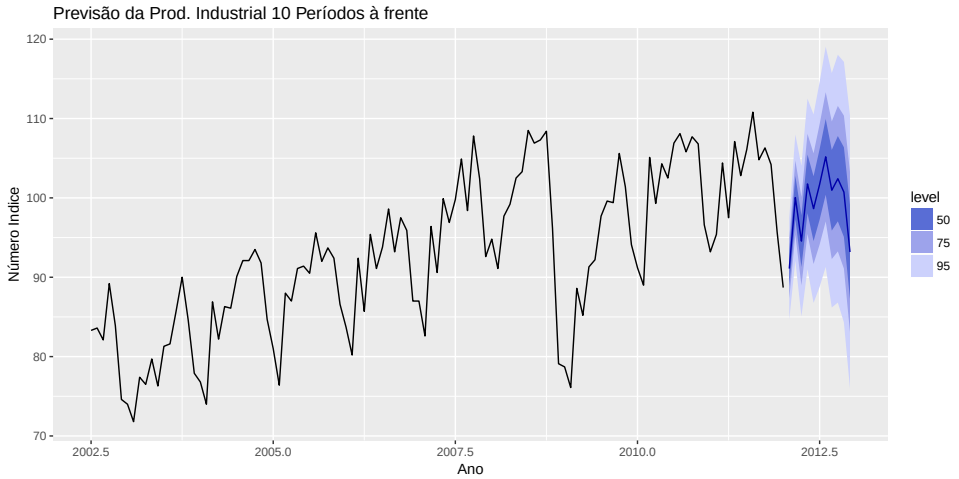
| | ME | RMSE | MAE | MPE | MAPE | MASE | ACF1 | Theil's U |
|---|---|---|---|---|---|---|---|---|
| Training set | -0.009 | 3.206 | 2.502 | -0.077 | 2.694 | 0.460 | -0.011 | |
| Test set | 2.608 | 6.067 | 4.773 | 2.224 | 4.940 | 0.878 | 0.683 | 0.966 |

```
fmodelo <- forecast(modelo,h=10,level=c(50,75,95))
autoplot(fmodelo,main='Previsão da Prod. Industrial 10 Períodos à frente',ylab='Número Indice',x
```




```
# Modelo Arimax
# Variáveis Exógenas
data2 <- ts(read.csv2('data2.csv', header=T, sep=';', dec=',')[,-1],
start=c(2002,07),end=c(2017,02), freq=12)
dates <- seq(as.Date('2002-01-01'),
             as.Date('2017-02-01'),by='1 month')
cambio <- data2[,4]-lag(data2[,4],-6)
commod <- data2[,6]-lag(data2[,6],-6)
amostra <- cbind(data2[,1:2], cambio, commod,data2[,8:9])
amostraf <- window(amostra,start=c(2012,02),end=c(2017,02))
amostra <- window(amostra,start=c(2002,07),end=c(2012,01))
data.forecast <- ts.intersect(data.forecast,amostraf)


# Modelo Arimax
modelo2 <- Arima(data.model[,1], order=c(1,1,0),
                 seasonal=c(2,0,0),xreg =amostra[,1:6] )

#3.
# Previsão 10 passos à frente com cenários
amostraf1 <- window(amostraf,start=c(2012,02),end=c(2012,12))
fmodelo2 <- forecast(modelo2,xreg=amostraf1,
```

```
                    h=10,level=c(50,75,95))
autoplot(fmodelo2,main='Previsão da Prod. Industrial 10 Períodos à frente',ylab='Número Indice',
```




```
#4
# Comparar Modelos
fmodelo2 <- forecast(modelo2,xreg=amostraf,
                     h=length(data.forecast[,1]),level=c(50,75,95))
accuracy2 <- accuracy(fmodelo2, data.forecast[,1])
tabela <- cbind(accuracy1[2,],accuracy2[2,])
colnames(tabela) <- c('Modelo Arima',
                      'Modelo Arimax')
xtable(tabela,align=c(
               "p{0.10\\textwidth}|",
               "R{0.37\\textwidth}|",
               "R{0.12\\textwidth}|"))
```

| | Modelo Arima | Modelo Arimax |
|---|---|---|
| ME | 2.61 | 1.33 |
| RMSE | 6.07 | 5.56 |
| MAE | 4.77 | 4.44 |
| MPE | 2.22 | 0.86 |
| MAPE | 4.94 | 4.70 |
| MASE | 0.88 | 0.82 |
| ACF1 | 0.68 | 0.67 |
| Theil's U | 0.97 | 0.92 |

```
# O modelo com variáveis exógenas obteve alguma melhora nos erros
```