Series de Tiempo 2018

Maestría en Estadística Aplicada, UNR

Unidad 10

Luis Damiano

damiano.luis@gmail.com

2018-05-10

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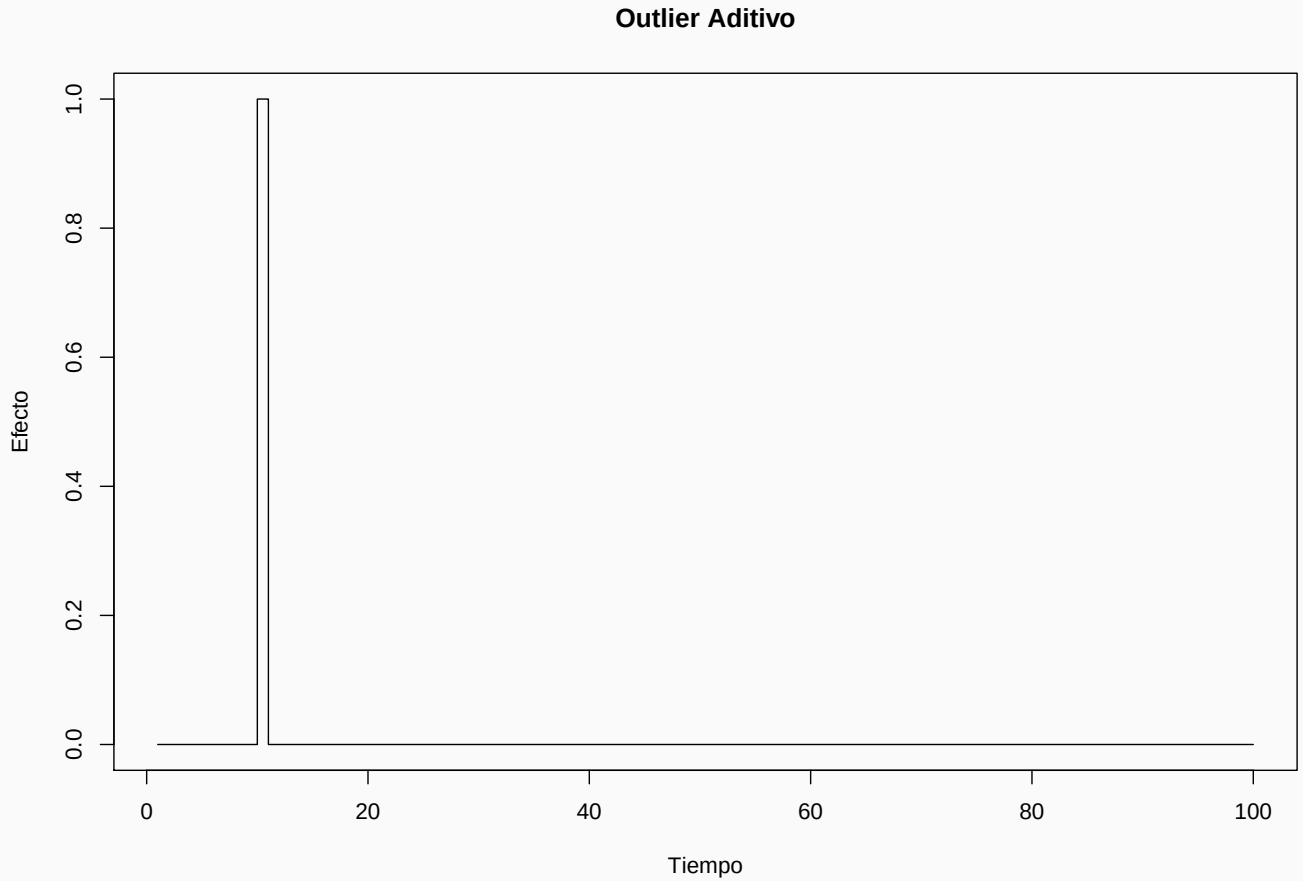
- Valores extremos

Valores extremos

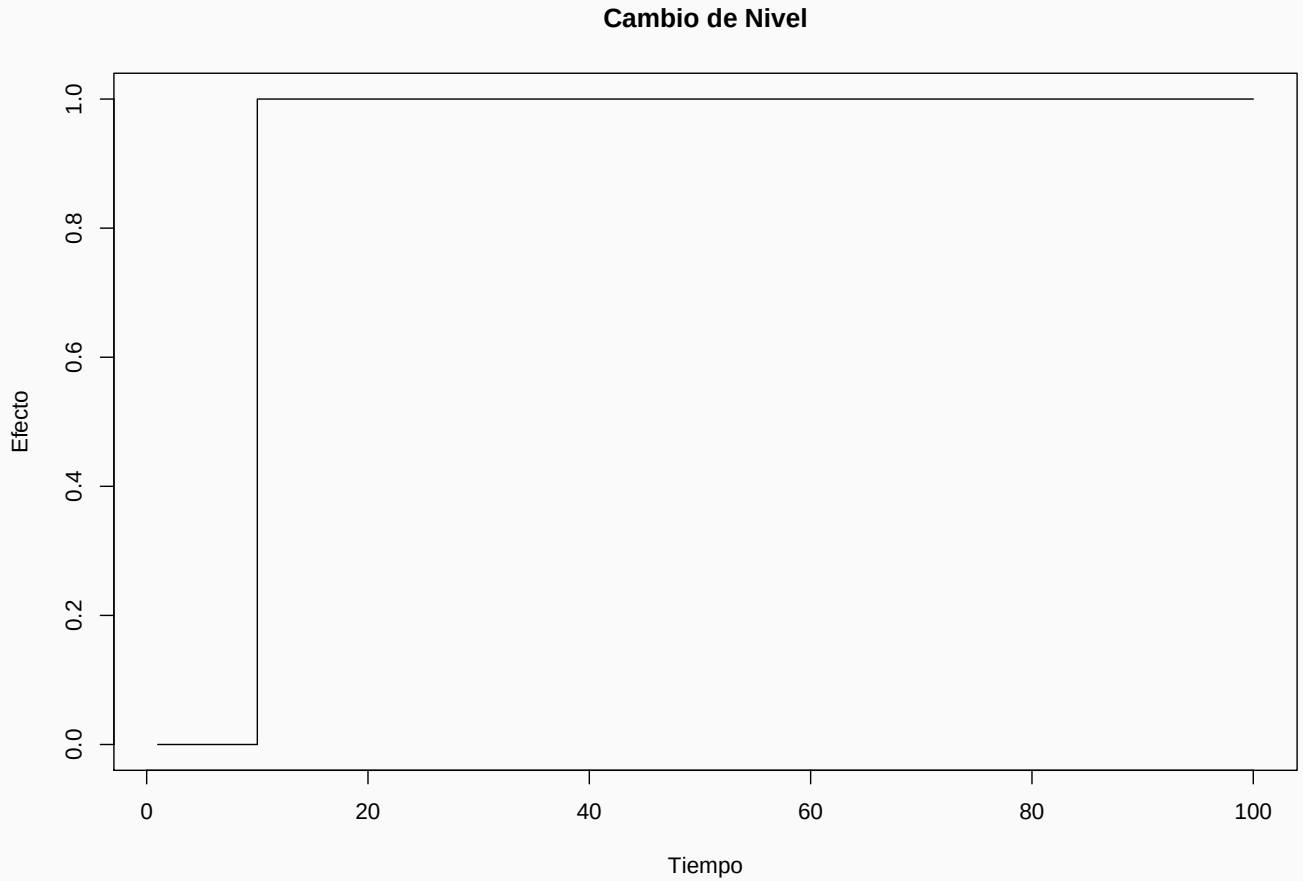
Outlier aditivo

```r
# Crea objeto outlier en t = 10
out <- outliers(type = "AO", ind  = 10)
# Produce la matriz de diseño (dummy) para una serie de largo T = 100
mat <- outliers.effects(out, 100)

plot(mat, type = "s", main = "Outlier Aditivo", ylab = "Efecto", xlab = "Tiempo")
```



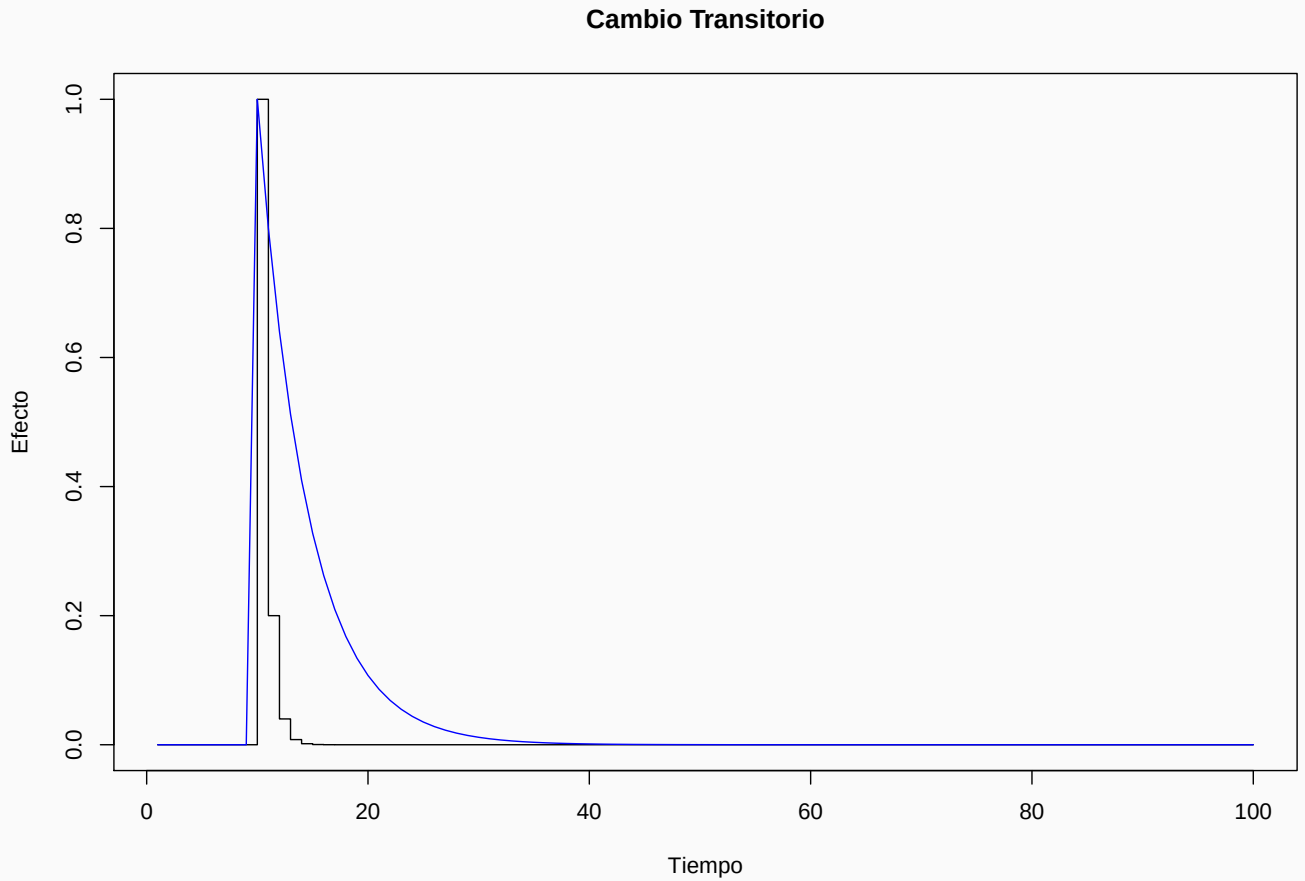
Cambio de nivel

```r
# Crea objeto outlier en t = 10
out <- outliers(type = "LS", ind  = 10)
# Produce la matriz de diseño (dummy) para una serie de largo T = 100
mat <- outliers.effects(out, 100)

plot(mat, type = "s", main = "Cambio de Nivel", ylab = "Efecto", xlab = "Tiempo")
```



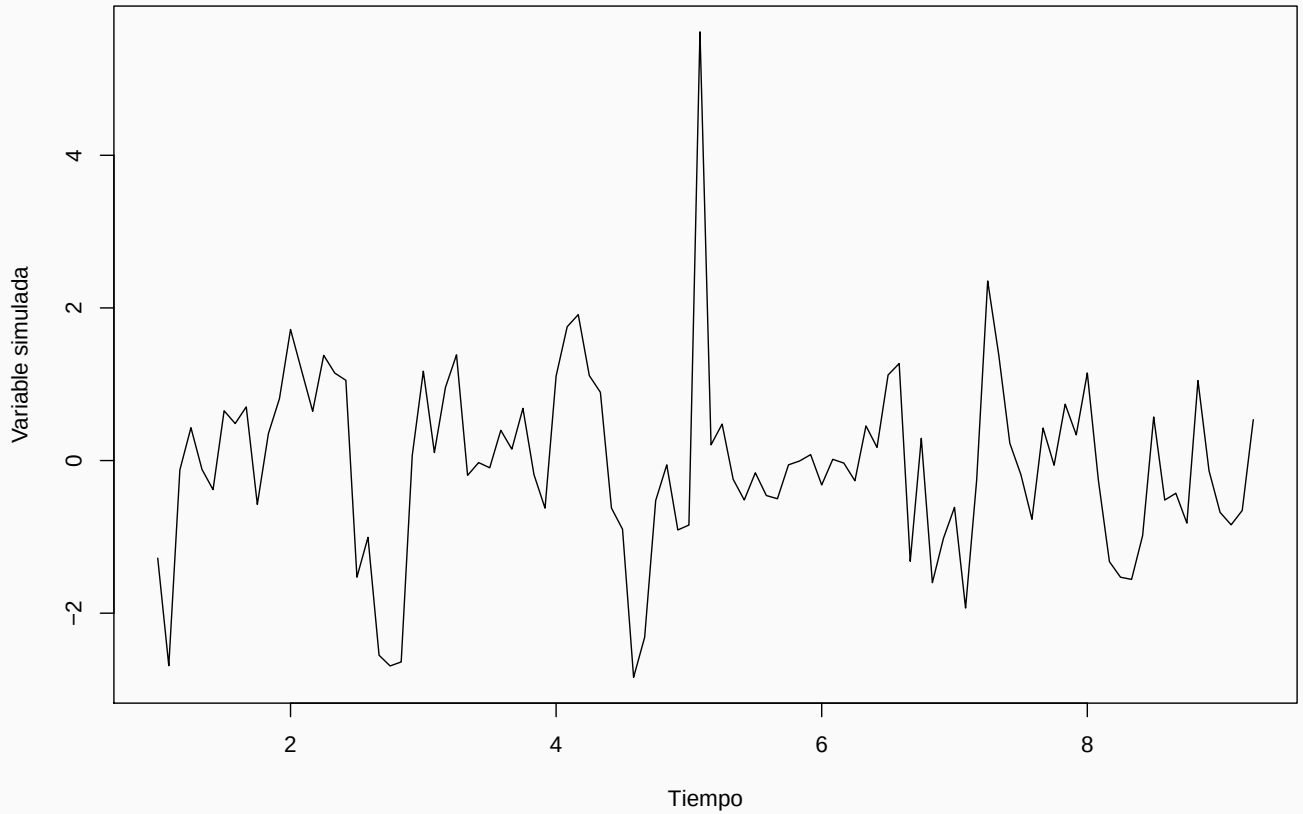
Cambio transitorio

```r
# Crea objeto outlier en t = 10
out <- outliers(type = "TC", ind  = 10)
mat1 <- outliers.effects(out, 100, delta = 0.2)
mat2 <- outliers.effects(out, 100, delta = 0.8)
plot(mat1, type = "s", main = "Cambio Transitorio", ylab = "Efecto", xlab = "Tiempo")
lines(mat2, col = "blue")
```



Simulación de un outlier aditivo

```r
set.seed(9000)
z  <- simAR1(phi1 = 0.5, sigma = 1, Z0 = 0, T = 100)
z  <- ts(z, frequency = 12)
z[50] <- z[50] + 7 # Agrega outlier aditivo en t = 50

plot(z, type = "l", ylab = "Variable simulada", xlab = "Tiempo")
```



Estimación sin considerar outlier (1)

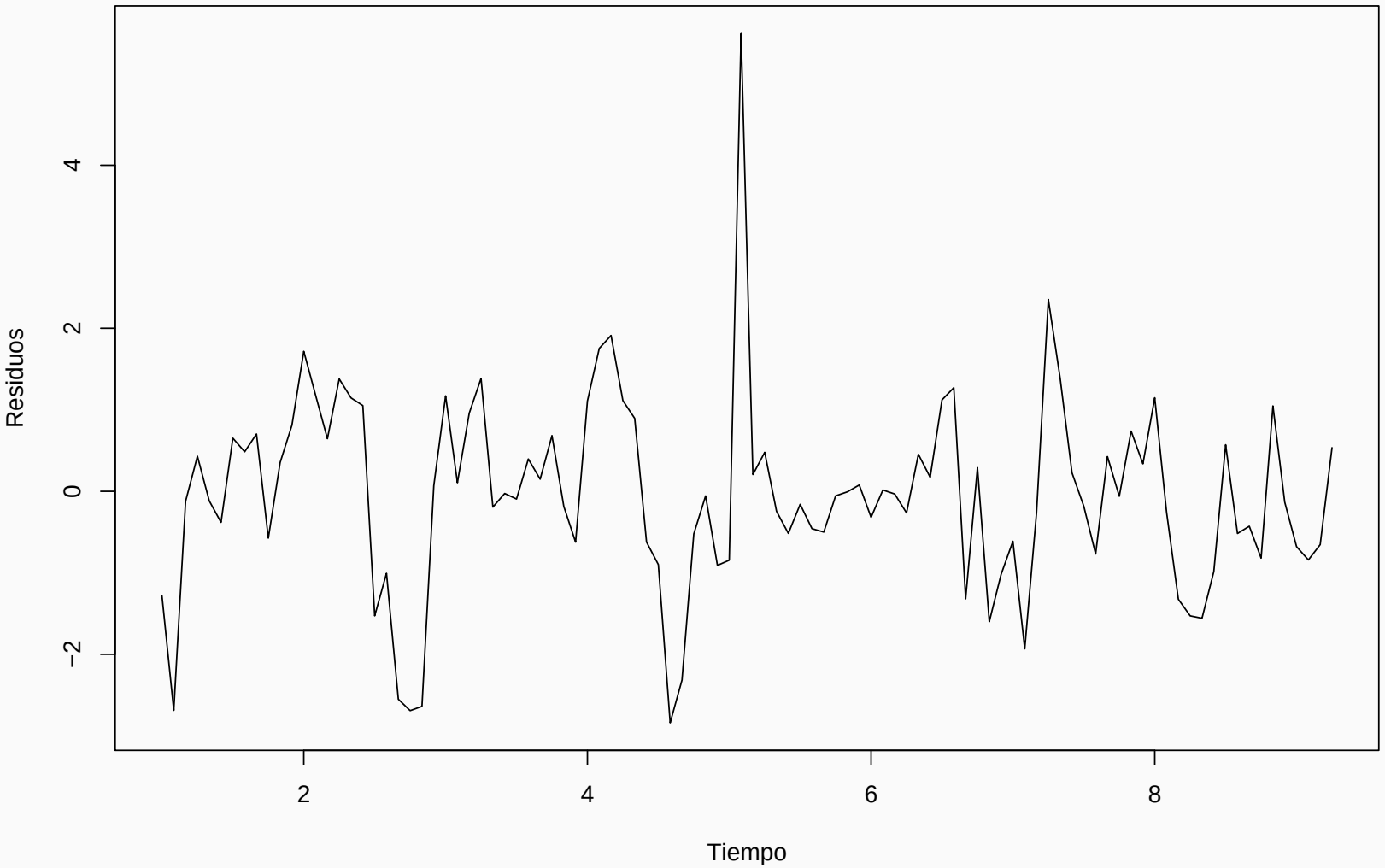
```
fit1 <- Arima(
  z,
  order = c(1, 0, 0),
  include.mean = FALSE
)

print(fit1)
```

```
## Series: z
## ARIMA(1,0,0) with zero mean
##
## Coefficients:
##          ar1
##       0.3972
## s.e.  0.0917
##
## sigma^2 estimated as 1.226:  log likelihood=-151.65
## AIC=307.3   AICc=307.42   BIC=312.51
```

```
sd(residuals(fit1))
```

```
## [1] 1.10674
```

Estimación sin considerar outlier (2)



Estimación con momento conocido

```
out <- outliers(type = "AO", ind  = 50)
mat <- outliers.effects(out, 100)

fit2 <- Arima(
  z,
  order = c(1, 0, 0),
  include.mean = FALSE,
  xreg  = mat
)

print(fit2)
```

```
## Series: z
## Regression with ARIMA(1,0,0) errors
##
## Coefficients:
##          ar1    AO50
##       0.5436  5.8849
## s.e.  0.0838  0.7829
##
## sigma^2 estimated as 0.8097:  log likelihood=-130.5
## AIC=267   AICc=267.25   BIC=274.82
```

```
sd(residuals(fit2))
```

```
## [1] 0.8941147
```

Estimación con momento no conocido (1)[1]

```
fit3 <- tso(
  y = z, types = c("AO", "LS", "TC"), tsmethod = "arima",
  args.tsmethod = list(order = c(1, 0, 0), include.mean = FALSE)
)

print(fit3)
```

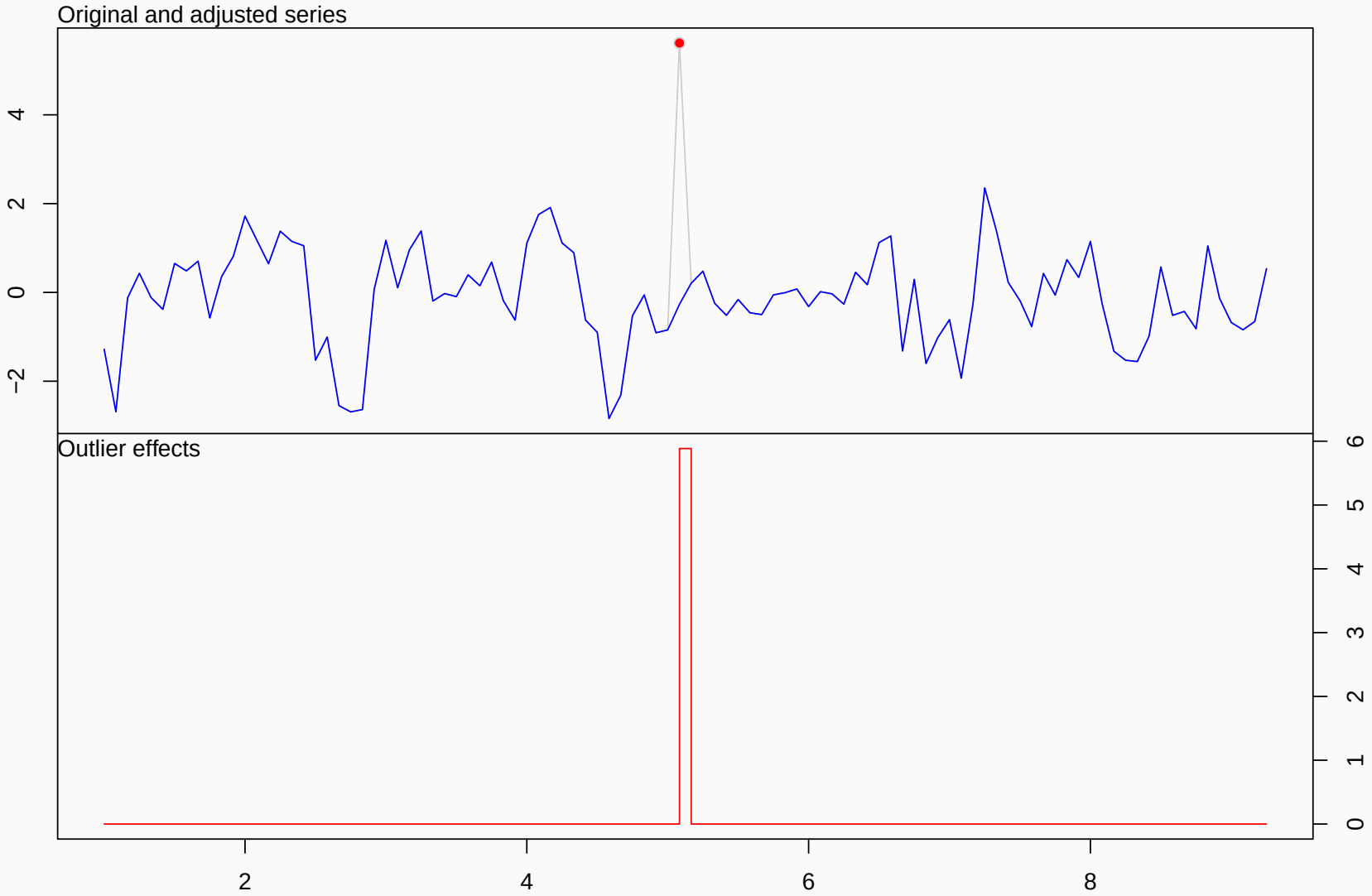
```
##
## Call:
## structure(list(method = NULL), .Names = "method")
##
## Coefficients:
##          ar1    AO50
##       0.5436  5.8849
## s.e.  0.0838  0.7829
##
## sigma^2 estimated as 0.7935:  log likelihood = -130.5,  aic = 267
##
## Outliers:
##   type ind time coefhat tstat
## 1   AO  50 5:02   5.885 7.517
```

```
sd(residuals(fit3$fit))
```

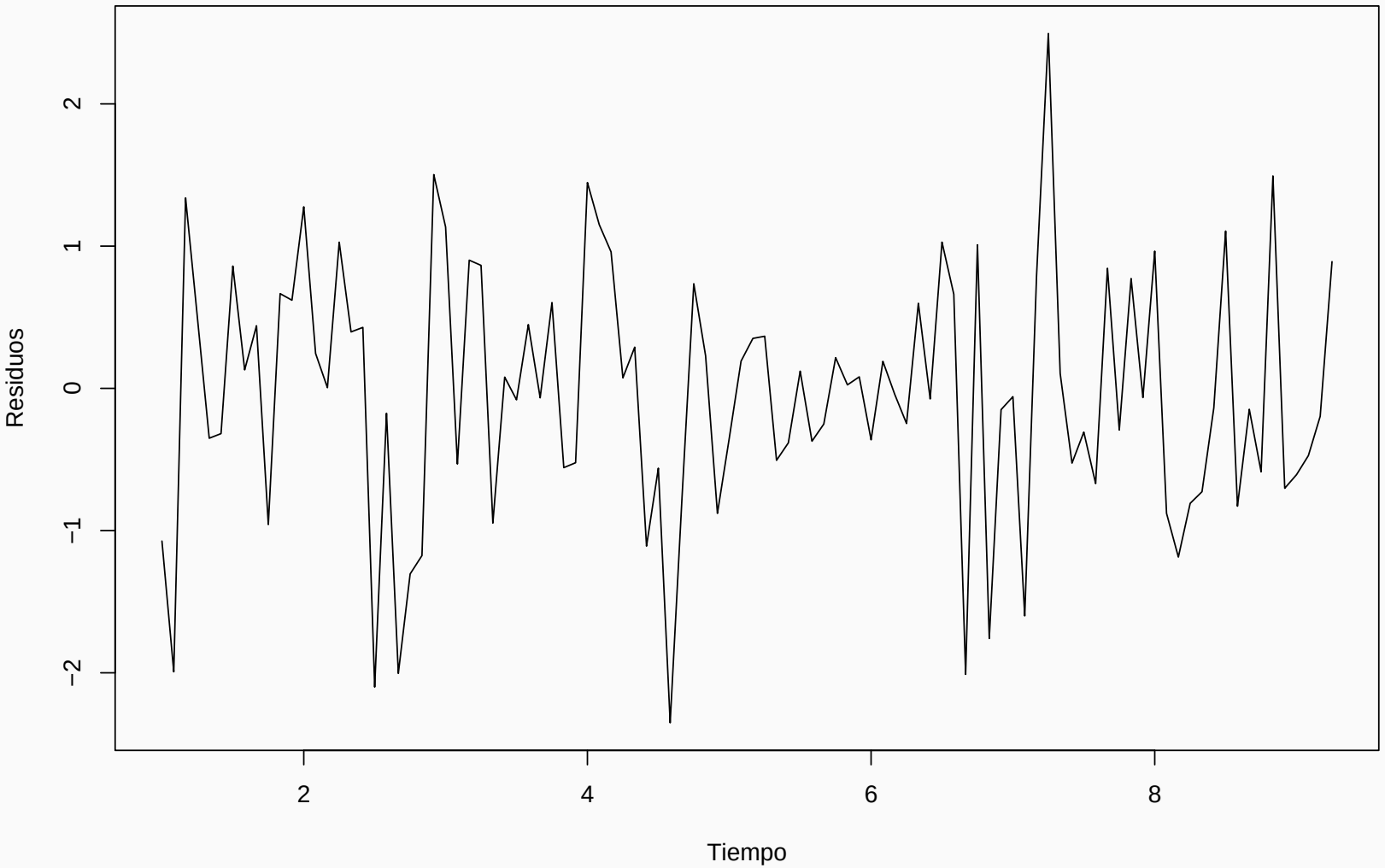
```
## [1] 0.8941147
```

[1] Chen and Liu (1993)

Estimación con momento no conocido (2)



Estimación con momento no conocido (3)



Referencias

Chen, Chung, and Lon-Mu Liu. 1993. "Joint Estimation of Model Parameters and Outlier Effects in Time Series." *Journal of the American Statistical Association* 88 (421). JSTOR: 284. doi:10.2307/2290724.