Análisis de la serie Daily Female Births

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```
## Warning: package 'forecast' was built under R version 4.1.1

## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo

##
## Attaching package: 'forecast'

## The following object is masked from 'package:astsa':
##
##     gas
```

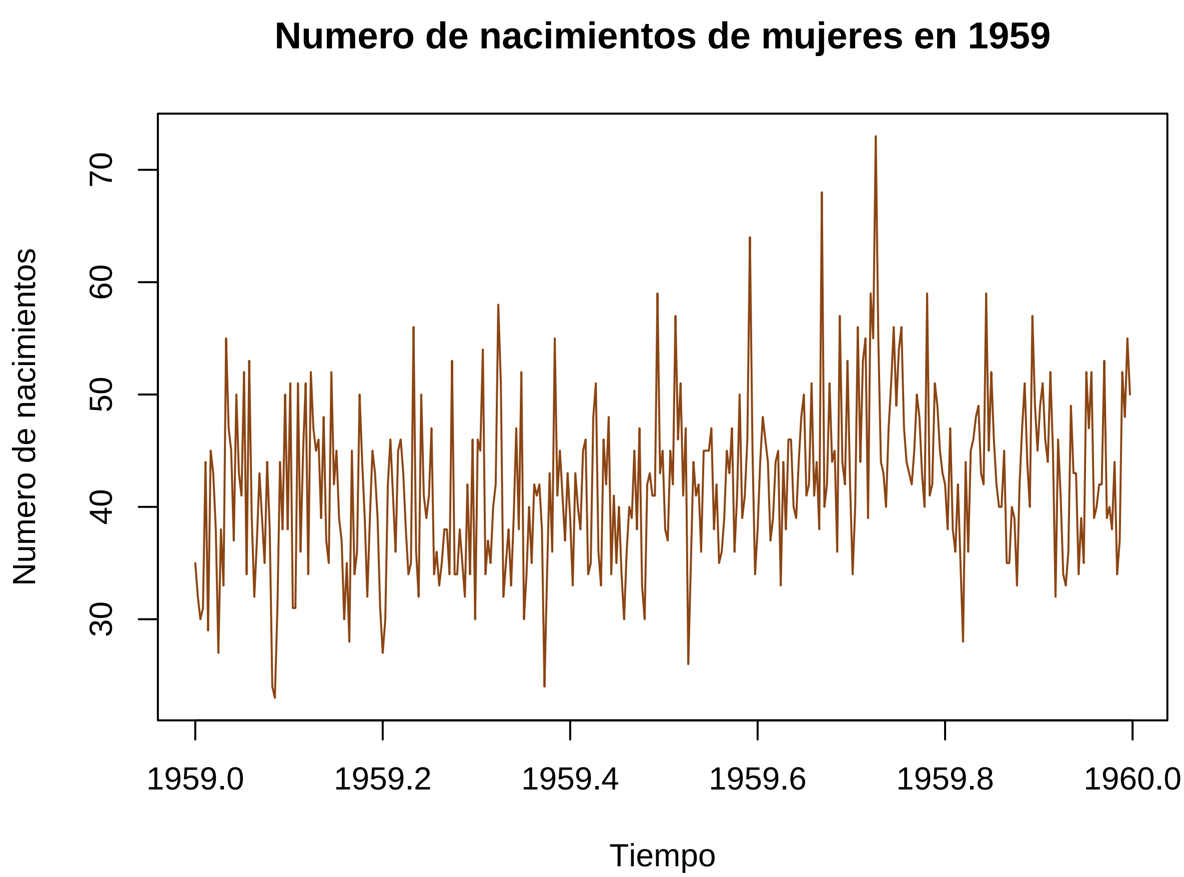
Modelando la serie DFBIC

Descripción

En esta parte se hara un análisis de la serie de tiempo "Daily Female births in California". Cuya descripción citare

> "Un conjunto de datos de series de tiempo que representa el número total de nacimientos de mujeres registrados en California, EE. UU. Durante el año de 1959"

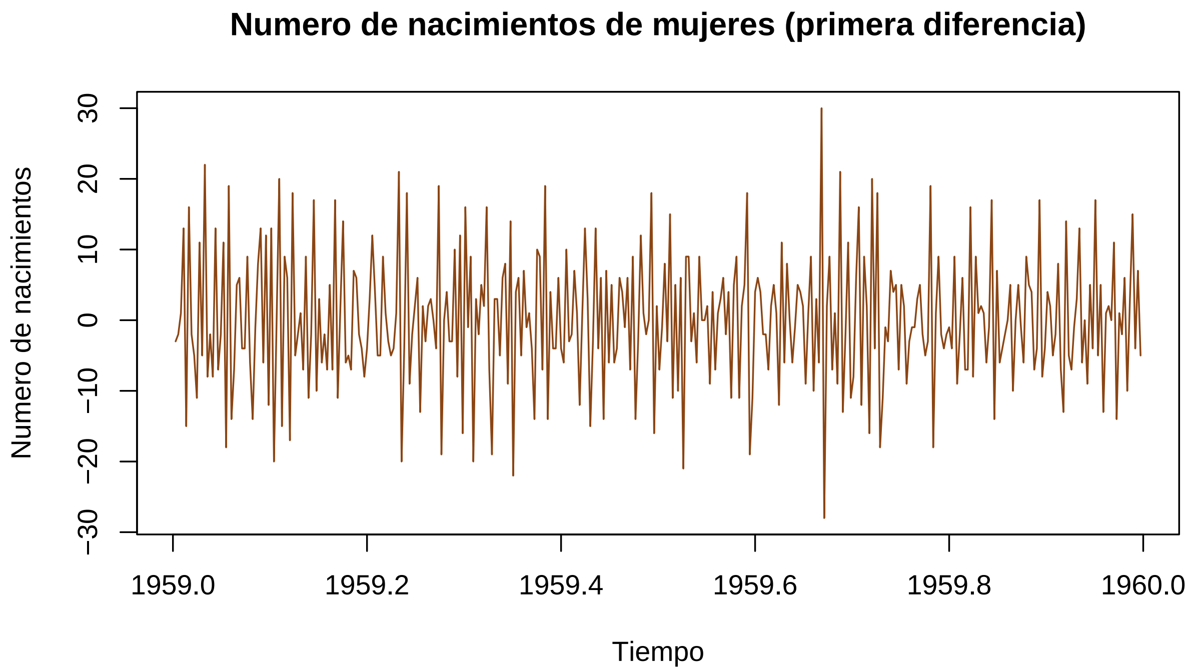
Visualización



Test de Box-Pierce

```
##
##  Box-Pierce test
##
## data:  birth.ts
## X-squared = 36.391, df = 5.8999, p-value = 2.088e-06
```

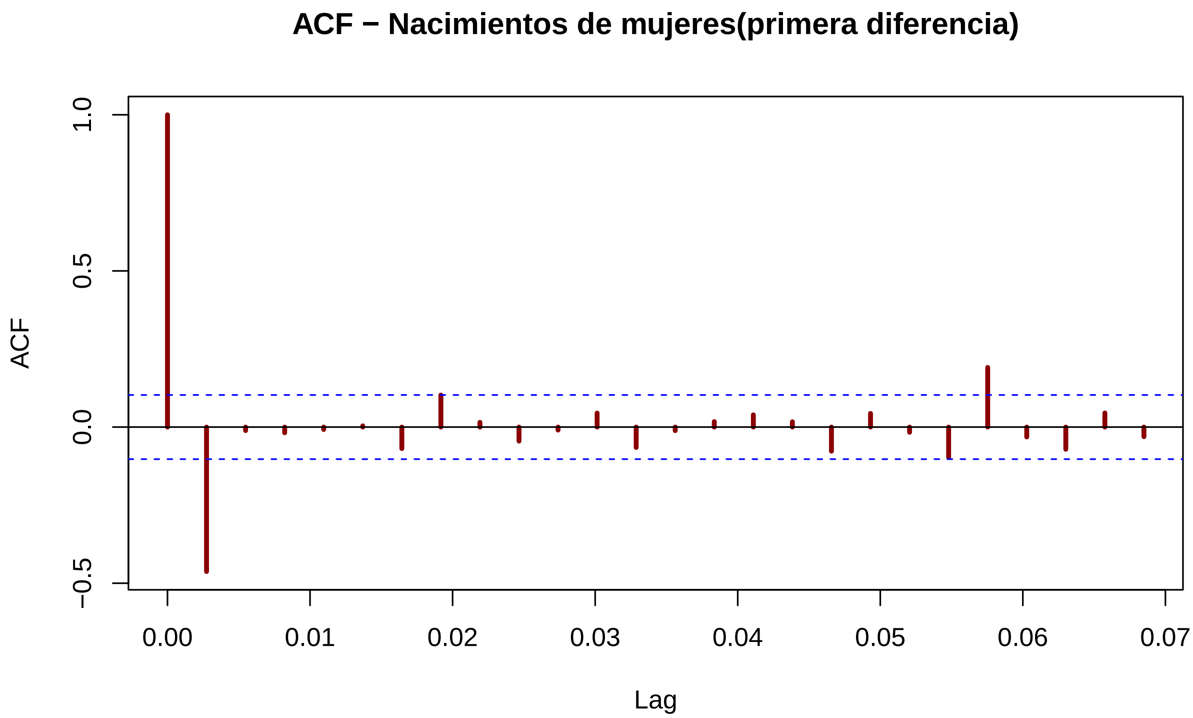
Primera diferencia

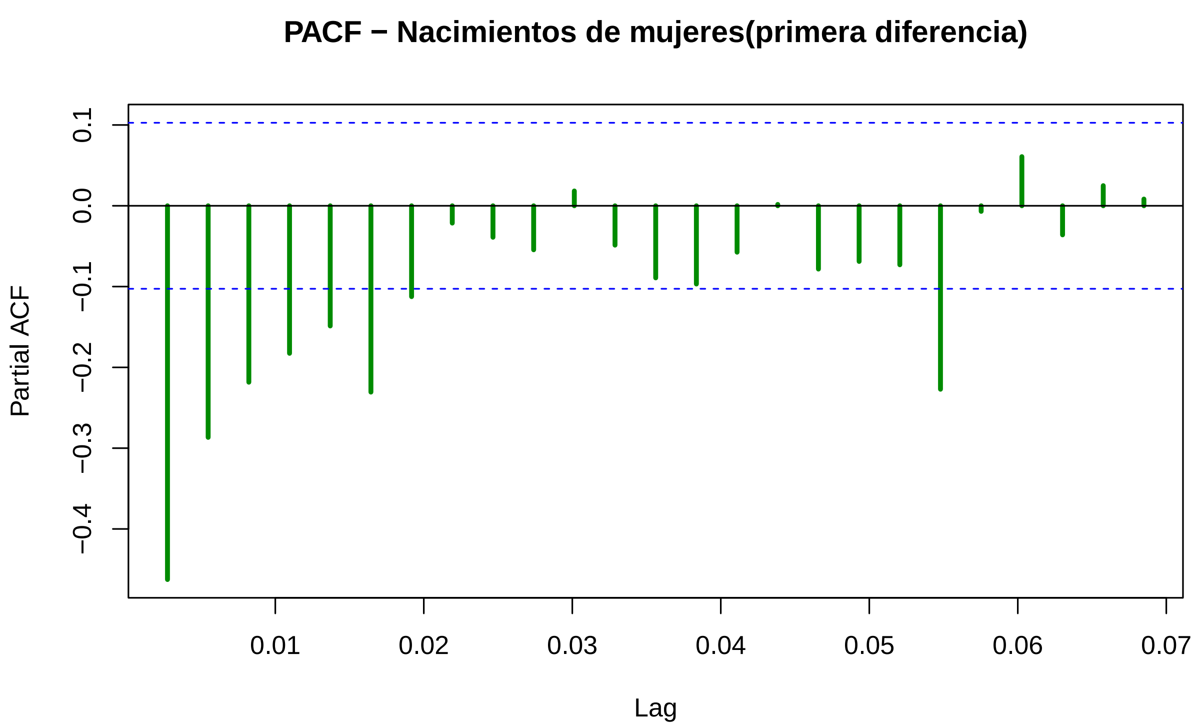


Test de Box-Pierce

```
##
##  Box-Pierce test
##
## data:  birth.ts_diff
## X-squared = 78.094, df = 5.8972, p-value = 7.661e-15
```

ACF y PACF


ACF − Nacimientos de mujeres(primera diferencia)
ACF
1.0
0.5
0.0
−0.5
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Lag


PACF − Nacimientos de mujeres(primera diferencia)
Partial ACF
0.1
0.0
−0.1
−0.2
−0.3
−0.4
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Lag

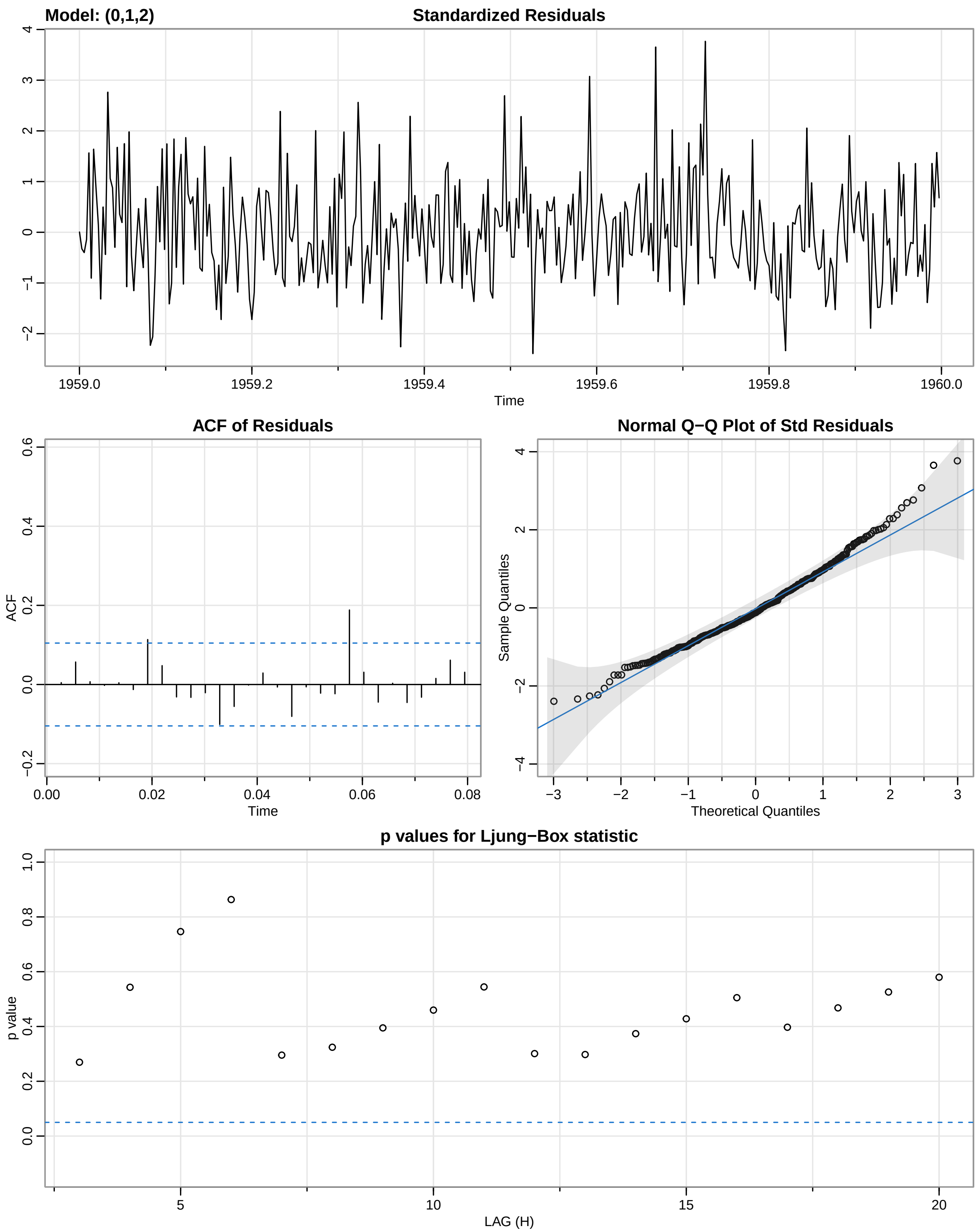
Ajustando modelos

Se proponen diferentes modelos y se llega a:

```
##         Arima(0,1,1)  Arima(0,1,2)  Arima(7,1,1)  Arima(7,1,2)
## AIC      2462.2207021  2459.5705306  2464.8827225  2466.6664136
## SSE     18148.4561632 17914.6513437 17584.3902548 17574.0578118
## p-value     0.5333604     0.9859227     0.9999899     0.9999929
```

Siendo el modelo final:

```
## initial  value 2.216721
## iter   2 value 2.047518
## iter   3 value 1.974780
## iter   4 value 1.966955
## iter   5 value 1.958906
## iter   6 value 1.952299
## iter   7 value 1.951439
## iter   8 value 1.950801
## iter   9 value 1.950797
## iter  10 value 1.950650
## iter  11 value 1.950646
## iter  12 value 1.950638
## iter  13 value 1.950635
## iter  13 value 1.950635
## iter  13 value 1.950635
## final  value 1.950635
## converged
## initial  value 1.950708
## iter   2 value 1.950564
## iter   3 value 1.950290
## iter   4 value 1.950196
## iter   5 value 1.950185
## iter   6 value 1.950185
## iter   7 value 1.950185
## iter   7 value 1.950185
## iter   7 value 1.950185
## final  value 1.950185
## converged
```




```
## $fit
##
## Call:
## arima(x = xdata, order = c(p, d, q), seasonal = list(order = c(P, D, Q), period = S),
```

```
##     xreg = constant, transform.pars = trans, fixed = fixed, optim.control = list(trace = trc,
##         REPORT = 1, reltol = tol))
##
## Coefficients:
##           ma1      ma2  constant
##       -0.8511  -0.1113     0.015
## s.e.   0.0496   0.0502     0.015
##
## sigma^2 estimated as 49.08:  log likelihood = -1226.36,  aic = 2460.72
##
## $degrees_of_freedom
## [1] 361
##
## $ttable
##          Estimate     SE  t.value p.value
## ma1       -0.8511 0.0496 -17.1448  0.0000
## ma2       -0.1113 0.0502  -2.2164  0.0273
## constant   0.0150 0.0150   1.0007  0.3176
##
## $AIC
## [1] 6.760225
##
## $AICc
## [1] 6.760408
##
## $BIC
## [1] 6.803051
```

Para asi finalmente obtener:

$$
\begin{aligned}
x_t - x_{t-1} &= 0.015 + Z_t - 0.8511 Z_{t-1} - 0.1113 Z_{t-2} \\
Z_t &\sim N(0, 49.08)
\end{aligned}
$$