Análisis de la serie de tiempo souvenir_sales

Contents

Información de contacto

Mail: alejandro.zavala1001@gmail.com

Facebook: https://www.facebook.com/AlejandroZavala1001

Git: https://github.com/AlejandroZavala98

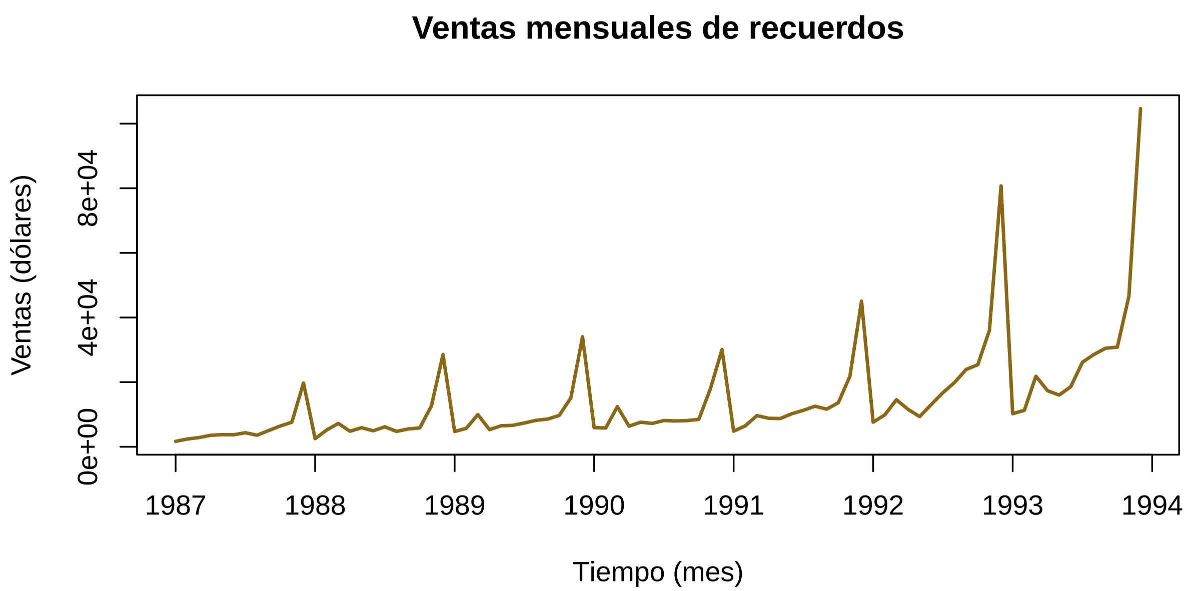
```
## Loading required package: zoo

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

## Loading required package: MASS

## 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
```

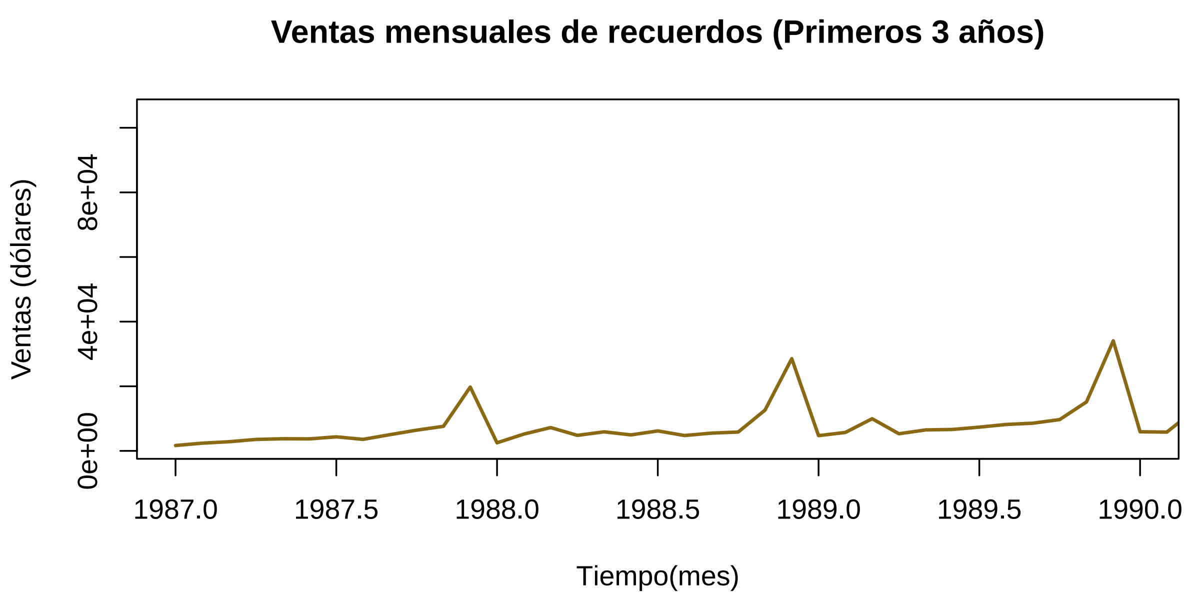
Modelando la serie "souvenir__sales"

Descripción

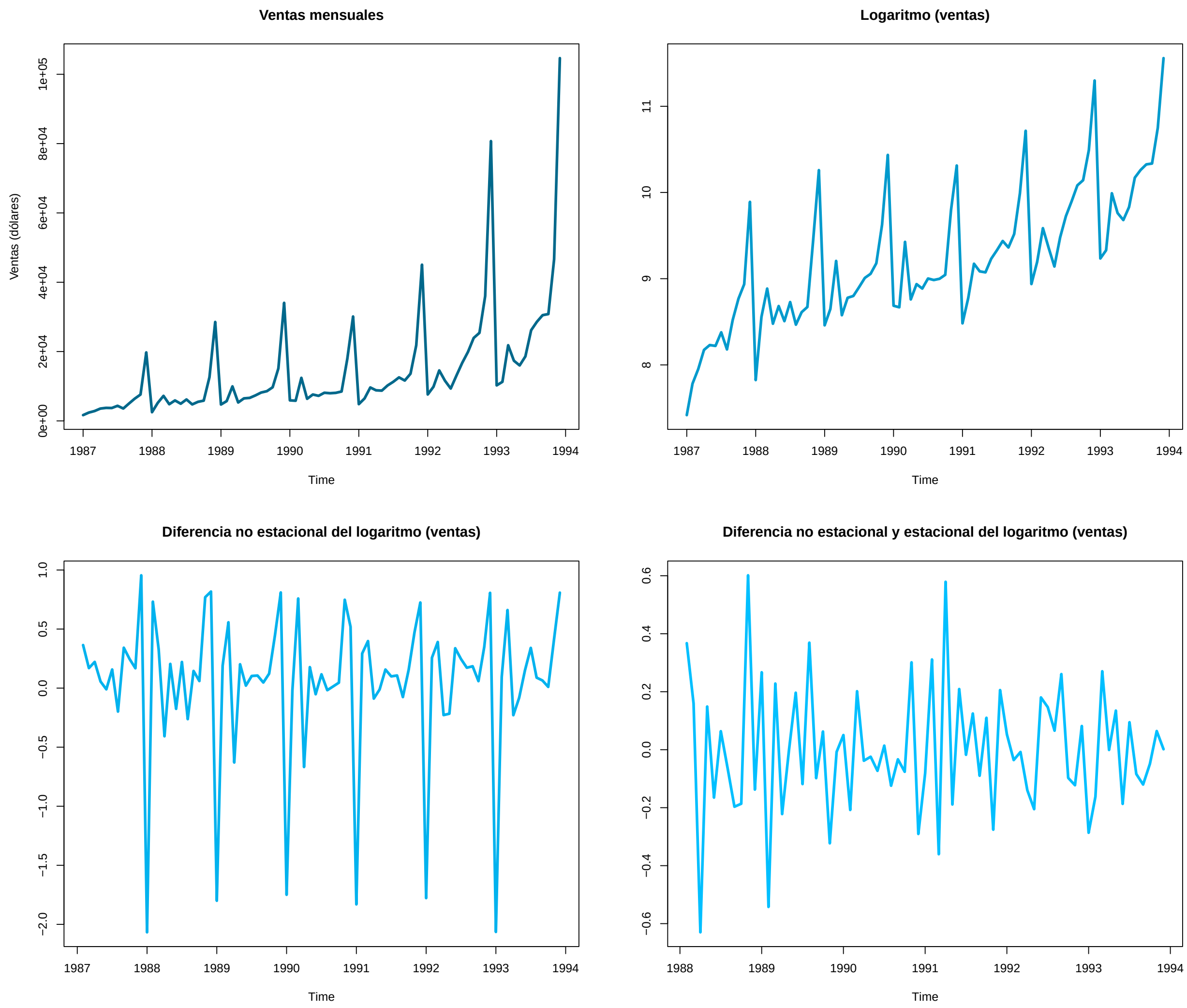
> "Ventas para una tienda de recuerdos en Queensland, Australia. Enero de 1987 a diciembre de 1993.Ventas, fuente: Makridakis, Wheelwright y Hyndman (1998)"

Visualización

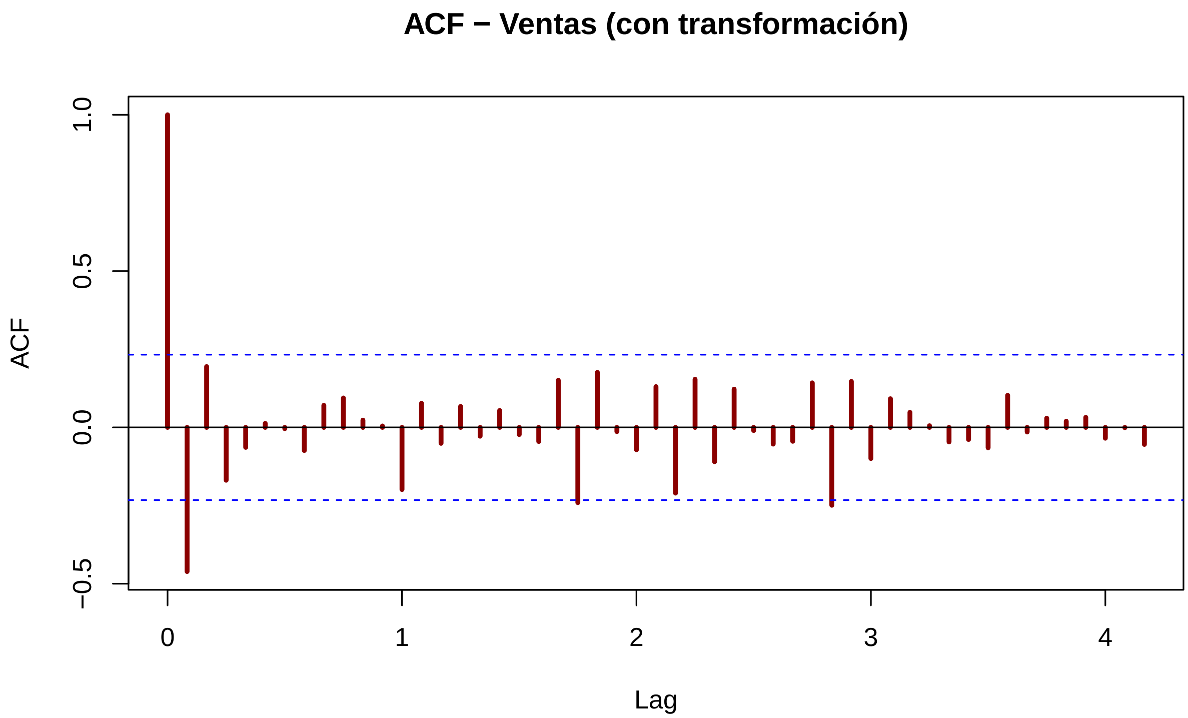


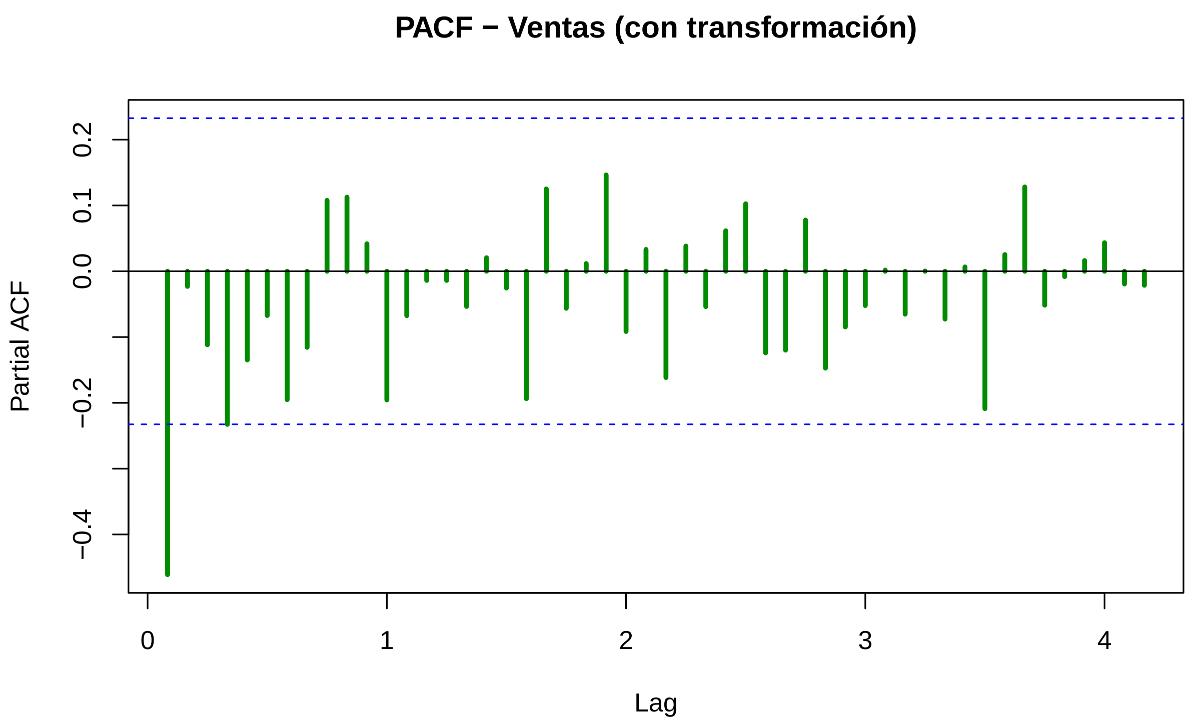


Algunas transformaciones importantes



ACF y PACF

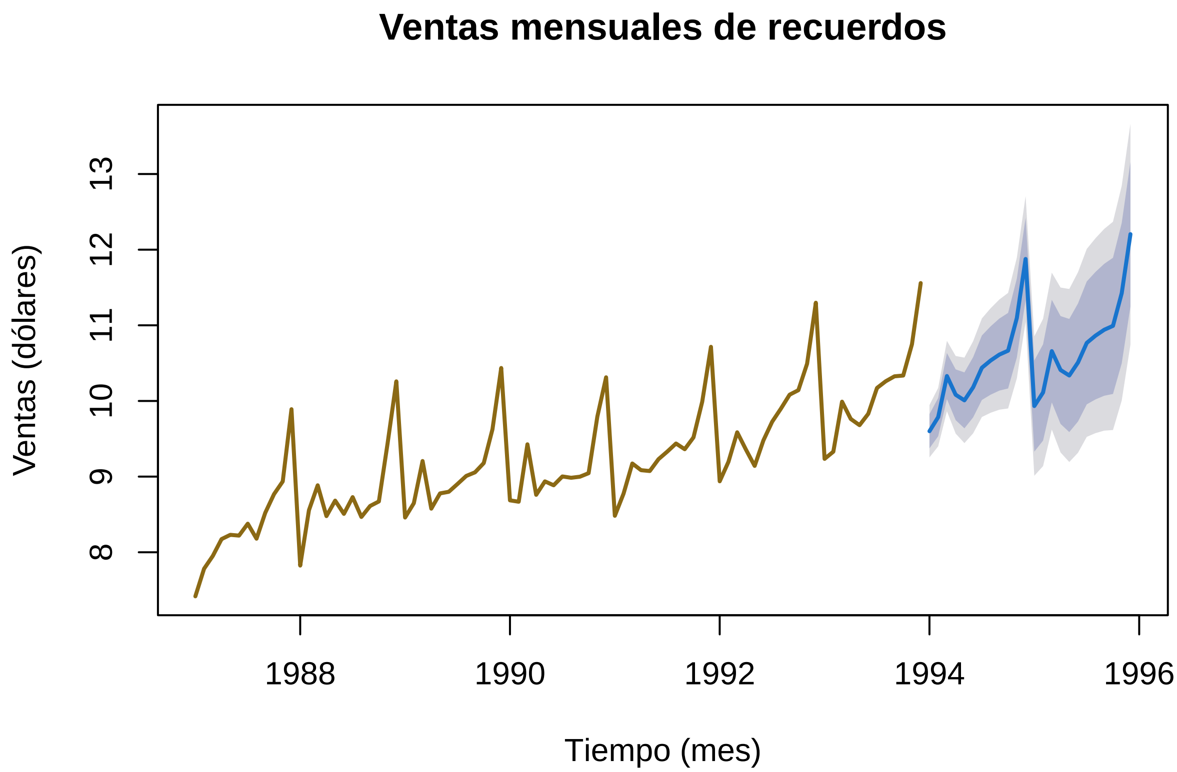

ACF − Ventas (con transformación)
ACF
1.0
0.5
0.0
−0.5
0
1
2
3
4
Lag


PACF − Ventas (con transformación)
Partial ACF
0.2
0.1
0.0
−0.2
−0.4
0
1
2
3
4
Lag

Ajustando diferentes modelos

```
## Modelo ( 0 1 0 0 1 0 12 ) AIC= -11.60664  SSE= 3.432906  p-VALUE= 0.0001365566
## Modelo ( 0 1 0 0 1 1 12 ) AIC= -16.09179  SSE= 2.97756  p-VALUE= 3.149952e-05
## Modelo ( 0 1 0 0 1 2 12 ) AIC= -17.58234  SSE= 2.301963  p-VALUE= 0.0002456591
## Modelo ( 0 1 0 0 1 3 12 ) AIC= -16.41016  SSE= 2.35266  p-VALUE= 0.0003392283
## Modelo ( 0 1 0 1 1 0 12 ) AIC= -13.43083  SSE= 3.214065  p-VALUE= 4.083839e-05
## Modelo ( 0 1 0 1 1 1 12 ) AIC= -17.76362  SSE= 2.399746  p-VALUE= 0.0001916565
## Modelo ( 0 1 0 1 1 2 12 ) AIC= -15.99095  SSE= 2.349897  p-VALUE= 0.0002477782
## Modelo ( 0 1 0 1 1 3 12 ) AIC= -14.74777  SSE= 2.302026  p-VALUE= 0.0004504601
## Modelo ( 0 1 1 0 1 0 12 ) AIC= -27.78538  SSE= 2.643277  p-VALUE= 0.1742478
## Modelo ( 0 1 1 0 1 1 12 ) AIC= -34.54538  SSE= 2.233424  p-VALUE= 0.2730783
## Modelo ( 0 1 1 0 1 2 12 ) AIC= -33.6145  SSE= 2.109473  p-VALUE= 0.2830597
## Modelo ( 0 1 1 0 1 3 12 ) AIC= -32.19273  SSE= 1.87789  p-VALUE= 0.270042
## Modelo ( 0 1 1 1 1 0 12 ) AIC= -32.33192  SSE= 2.360507  p-VALUE= 0.2584529
## Modelo ( 0 1 1 1 1 1 12 ) AIC= -34.0881  SSE= 1.842013  p-VALUE= 0.2843225
## Modelo ( 0 1 1 1 1 2 12 ) AIC= -32.1017  SSE= 1.856342  p-VALUE= 0.28516
## Modelo ( 1 1 0 0 1 0 12 ) AIC= -27.07825  SSE= 2.6747  p-VALUE= 0.2297871
## Modelo ( 1 1 0 0 1 1 12 ) AIC= -34.98918  SSE= 2.209442  p-VALUE= 0.4633806
## Modelo ( 1 1 0 0 1 2 12 ) AIC= -33.38623  SSE= 2.159411  p-VALUE= 0.4515394
## Modelo ( 1 1 0 0 1 3 12 ) AIC= -31.54519  SSE= 2.121635  p-VALUE= 0.4390829
## Modelo ( 1 1 0 1 1 0 12 ) AIC= -32.64858  SSE= 2.340077  p-VALUE= 0.4022223
## Modelo ( 1 1 0 1 1 1 12 ) AIC= -33.48894  SSE= 2.125766  p-VALUE= 0.4442669
## Modelo ( 1 1 0 1 1 2 12 ) AIC= -31.52137  SSE= 2.093124  p-VALUE= 0.4463098
## Modelo ( 1 1 1 0 1 0 12 ) AIC= -26.17089  SSE= 2.624281  p-VALUE= 0.2507443
## Modelo ( 1 1 1 0 1 1 12 ) AIC= -33.30647  SSE= 2.201798  p-VALUE= 0.411014
## Modelo ( 1 1 1 0 1 2 12 ) AIC= -31.68924  SSE= 2.151774  p-VALUE= 0.3820814
## Modelo ( 1 1 1 1 1 0 12 ) AIC= -31.10127  SSE= 2.323818  p-VALUE= 0.3492746
## Modelo ( 1 1 1 1 1 1 12 ) AIC= -32.69913  SSE= 1.824041  p-VALUE= 0.3092406
```

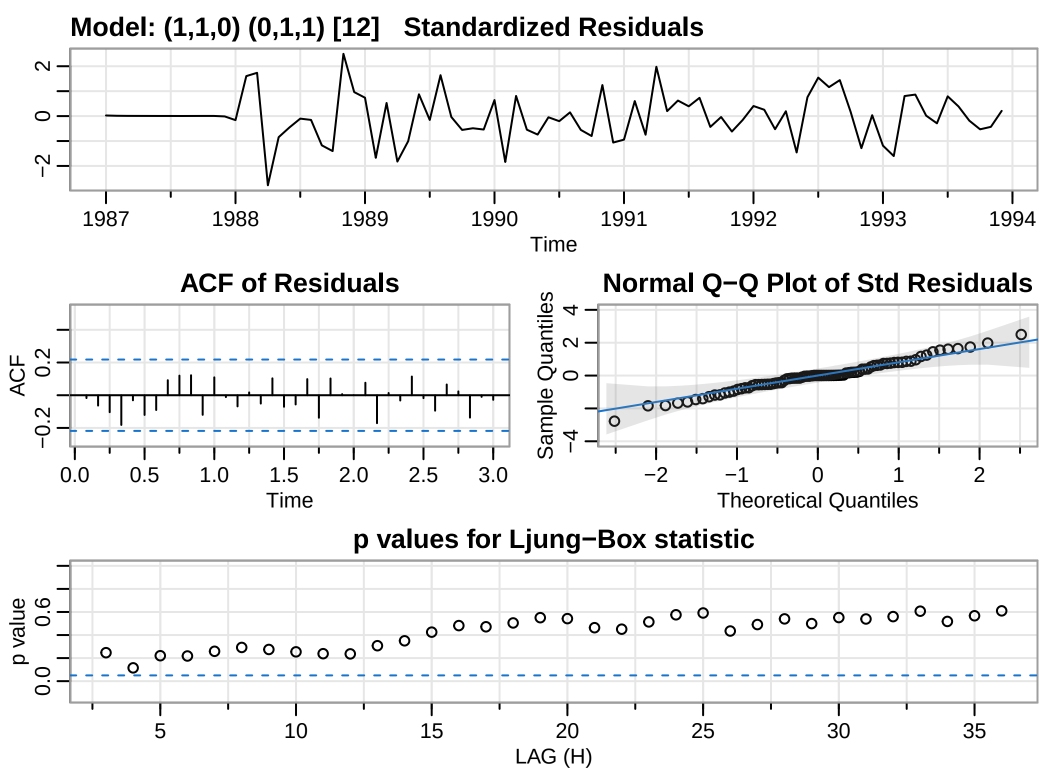
Pronóstico



	Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
Jan 1994	9.600020	9.373967	9.826071	9.254303	9.945736
Feb 1994	9.786505	9.533944	10.039066	9.400246	10.172764
Mar 1994	10.329605	10.025423	10.633786	9.864399	10.794810
Apr 1994	10.081973	9.746705	10.417240	9.569225	10.594720
May 1994	10.008096	9.638604	10.377587	9.443007	10.573184
Jun 1994	10.181170	9.783094	10.579245	9.572365	10.789974
Jul 1994	10.439372	10.013362	10.865383	9.787845	11.090900
Aug 1994	10.534857	10.083237	10.986477	9.844164	11.225551
Sep 1994	10.613025	10.136886	11.089165	9.884833	11.341218
Oct 1994	10.664526	10.165207	11.163846	9.900883	11.428170
Nov 1994	11.096784	10.575248	11.618321	10.299163	11.894406
Dec 1994	11.877167	11.334355	12.419979	11.047007	12.707327

Modelo final

```
## initial  value -1.527727
## iter   2 value -1.675635
## iter   3 value -1.682326
## iter   4 value -1.682437
## iter   5 value -1.682439
## iter   5 value -1.682439
## iter   5 value -1.682439
## final  value -1.682439
## converged
## initial  value -1.692103
## iter   2 value -1.704334
## iter   3 value -1.707567
## iter   4 value -1.707595
## iter   5 value -1.707595
## iter   5 value -1.707595
## iter   5 value -1.707595
## final  value -1.707595
## converged
```




```
## $fit
##
## Call:
## arima(x = xdata, order = c(p, d, q), seasonal = list(order = c(P, D, Q), period = S),
##     include.mean = !no.constant, transform.pars = trans, fixed = fixed, optim.control = list(trace =
##         REPORT = 1, reltol = tol))
##
```

```
## Coefficients:
##           ar1     sma1
##       -0.5017  -0.5107
## s.e.   0.1013   0.1543
##
## sigma^2 estimated as 0.03111:  log likelihood = 20.49,  aic = -34.99
##
## $degrees_of_freedom
## [1] 69
##
## $ttable
##      Estimate     SE t.value p.value
## ar1   -0.5017 0.1013 -4.9531  0.0000
## sma1  -0.5107 0.1543 -3.3098  0.0015
##
## $AIC
## [1] -0.4266974
##
## $AICc
## [1] -0.4248449
##
## $BIC
## [1] -0.3439164
```

De tal modo se propone el siguiente modelo:

$$
\begin{aligned}
&Y_t = 0.4983Y_{t-1} + 0.5017Y_{t-2} + Y_{t-12} - 0.4983Y_{t-13} - 0.5017Y_{t-14} + Z_t - 0.5107Z_{t-12} \\
&Z_t \sim N(0, 0.03111) \\
&Y_t = \log(x_t)
\end{aligned}
$$