Econometría Financiera

Rodrigo Ortiz, PhD

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```
# cargar librer?as
library(quantmod)
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

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

```
## Loading required package: TTR
```

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

```
library(tseries)
library(lmtest)
library(forecast)
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```
#Tutorial Como importar datos de Yahoo Finance a RStudio
mdate="2014-09-17"
BTC_USD_prices=getSymbols('BTC-USD', from=mdate, auto.assign = F)
head(BTC_USD_prices)
```

```
##            BTC-USD.Open BTC-USD.High BTC-USD.Low BTC-USD.Close BTC-USD.Volume
## 2014-09-17      465.864      468.174     452.422       457.334       21056800
## 2014-09-18      456.860      456.860     413.104       424.440       34483200
## 2014-09-19      424.103      427.835     384.532       394.796       37919700
## 2014-09-20      394.673      423.296     389.883       408.904       36863600
## 2014-09-21      408.085      412.426     393.181       398.821       26580100
## 2014-09-22      399.100      406.916     397.130       402.152       24127600
##            BTC-USD.Adjusted
## 2014-09-17          457.334
## 2014-09-18          424.440
```

```
## 2014-09-19          394.796
## 2014-09-20          408.904
## 2014-09-21          398.821
## 2014-09-22          402.152
```

```
mdate="2014-09-17"
BTC_USD_prices_1=getSymbols('BTC-USD', from=mdate, auto.assign = F)[,4]
head(BTC_USD_prices_1)
```

```
##            BTC-USD.Close
## 2014-09-17       457.334
## 2014-09-18       424.440
## 2014-09-19       394.796
## 2014-09-20       408.904
## 2014-09-21       398.821
## 2014-09-22       402.152
```

```
plot(BTC_USD_prices_1)
```


```
# definir la serie de tiempo
#BTC_USD_prices_1 <- ts(BTC_USD_prices_1, start = decimal_date(ymd("2014-09-17")),
#                       frequency = 365)

#Retorno discreto
BTC_USD_prices_1_roc_d=ROC(BTC_USD_prices_1, type='discret')
head(BTC_USD_prices_1_roc_d)
```

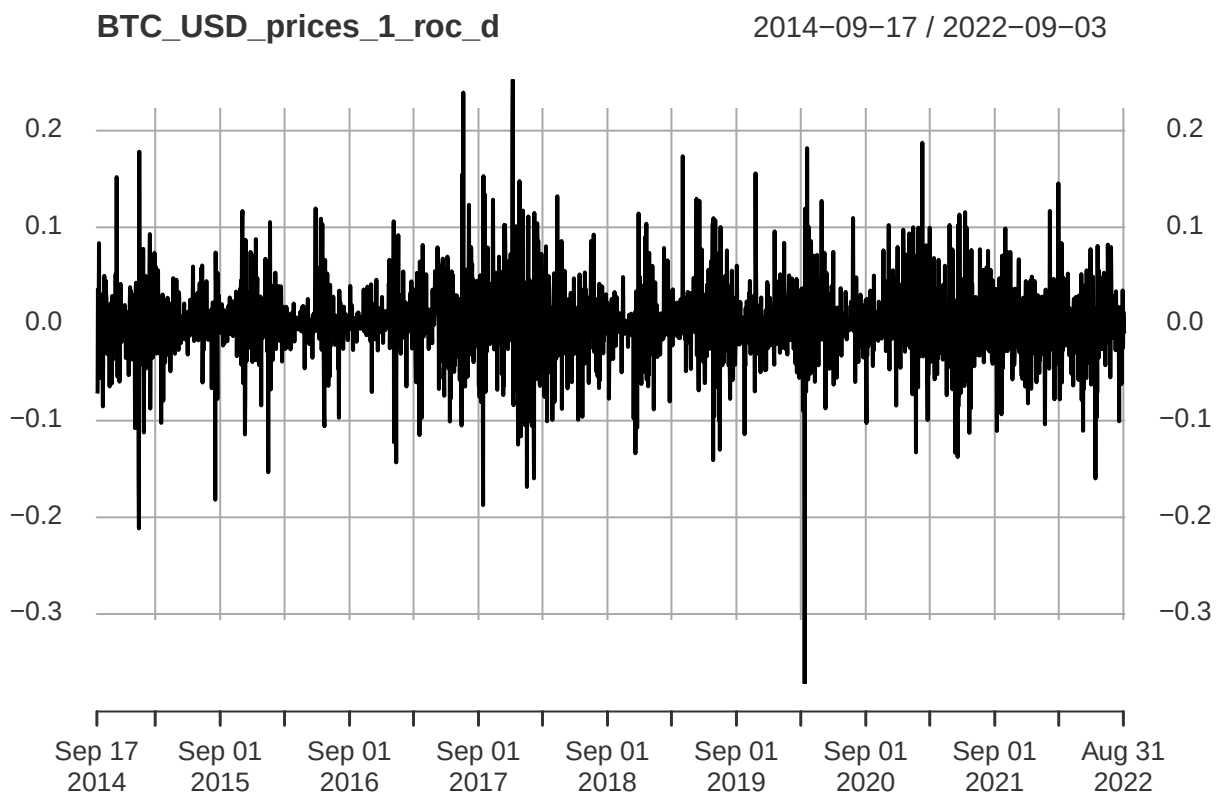
```
##            BTC-USD.Close
## 2014-09-17            NA
## 2014-09-18  -0.071925577
## 2014-09-19  -0.069842644
```

```
## 2014-09-20   0.035734917
## 2014-09-21  -0.024658546
## 2014-09-22   0.008352103
```

```
(424.440-457.334)/457.334
```

```
## [1] -0.07192555
```

```
plot(BTC_USD_prices_1_roc_d)
```



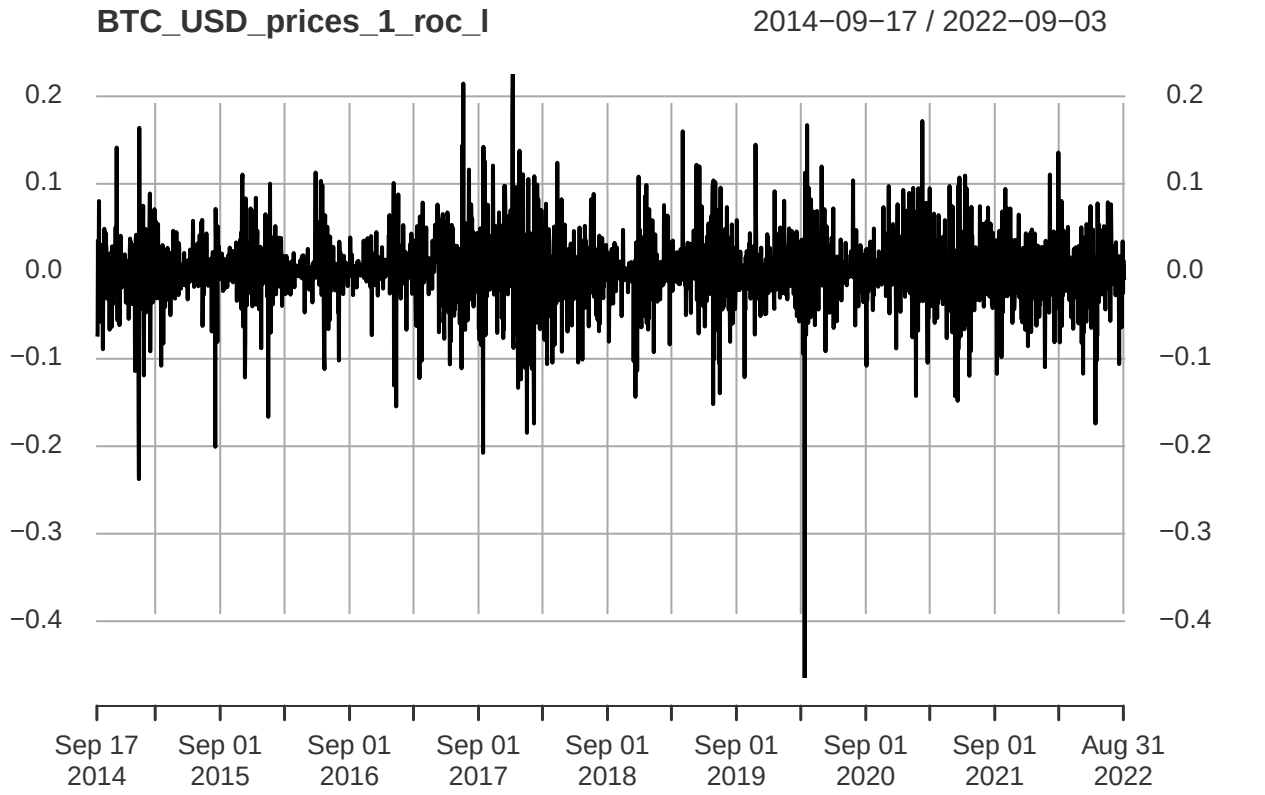

```
#Retorno logaritmico
BTC_USD_prices_1_roc_l=ROC(BTC_USD_prices_1, type='continuous')
log(424.440/457.334)
```

```
## [1] -0.07464332
```

```
head(BTC_USD_prices_1_roc_l)
```

```
##            BTC-USD.Close
## 2014-09-17            NA
## 2014-09-18  -0.074643352
## 2014-09-19  -0.072401507
## 2014-09-20   0.035111240
## 2014-09-21  -0.024967660
## 2014-09-22   0.008317417
```

```
plot(BTC_USD_prices_1_roc_l)
```

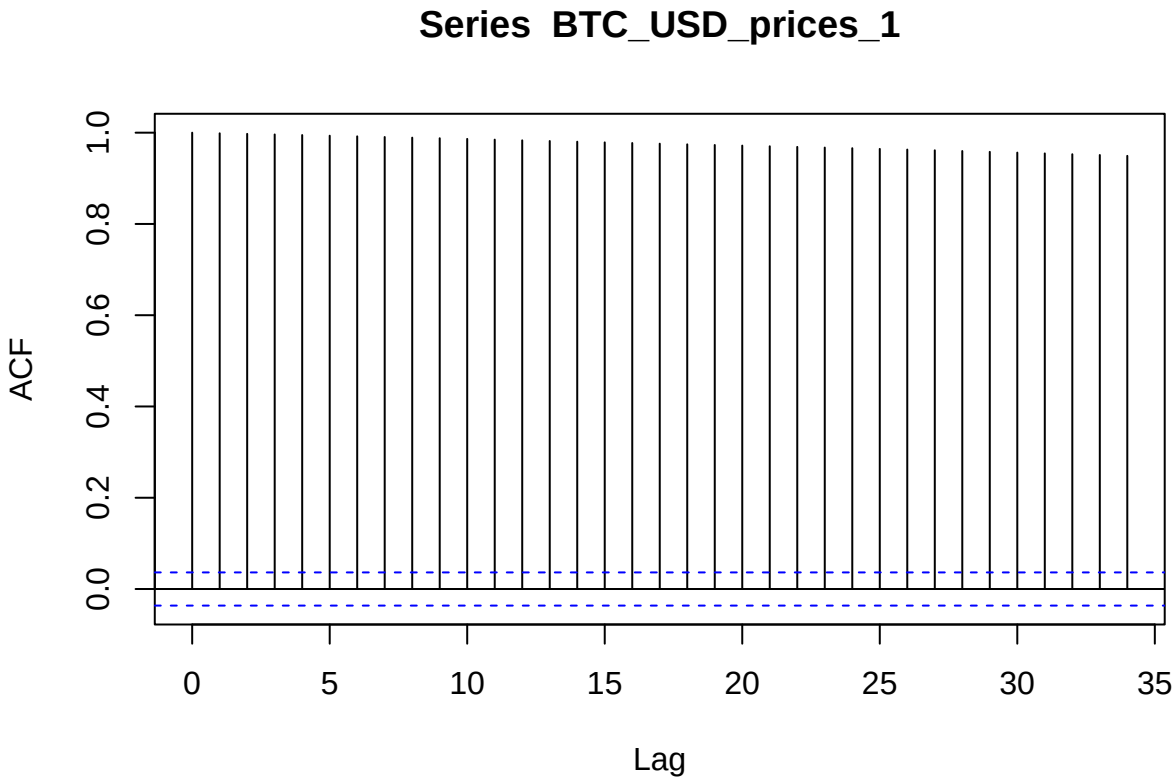



```
# otro tipo de gr?fico
chartSeries(BTC_USD_prices_1)
```

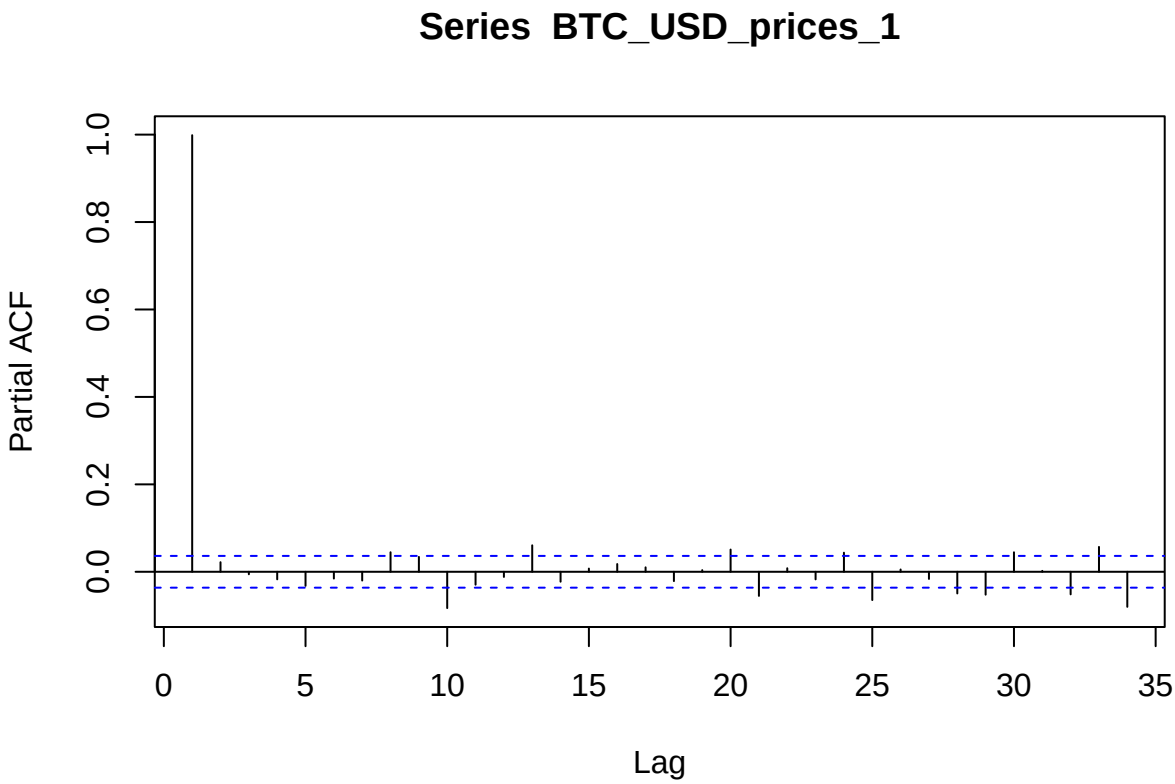

```
chartSeries(BTC_USD_prices_1, subset ="last 3 months")
```


```
# Serie en logaritmo
BTC_USD_log=log(BTC_USD_prices_1)

# Autocorrelaci?n y autocorrelaci?n parcial
acf(BTC_USD_prices_1)
```




```
pacf(BTC_USD_prices_1)
```




```
# Modelo AR(1)
modelo_1=arima(BTC_USD_log, order=c(1,0,0))
```

```
modelo_1
```

```
##
## Call:
## arima(x = BTC_USD_log, order = c(1, 0, 0))
##
## Coefficients:
##          ar1  intercept
##       0.9998     8.3115
## s.e.  0.0003     1.6320
##
## sigma^2 estimated as 0.001522:  log likelihood = 5305.11,  aic = -10604.22
```

```
coeftest(modelo_1)
```

```
##
## z test of coefficients:
##
##             Estimate Std. Error  z value  Pr(>|z|)
## ar1       0.99977835 0.00025201 3967.216 < 2.2e-16 ***
## intercept 8.31154100 1.63196735    5.093 3.525e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(modelo_1)
```

```
##               2.5 %    97.5 %
## ar1       0.9992844  1.000272
## intercept 5.1129438 11.510138
```

```
AIC(modelo_1)
```

```
## [1] -10604.22
```

```
BIC(modelo_1)
```

```
## [1] -10586.3
```

```
e1=residuals(modelo_1)
summary(e1)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## -0.464583 -0.013799  0.001636  0.001280  0.017766  0.225397
```

```
absserr_1=abs(e1)
summary(absserr_1)
```

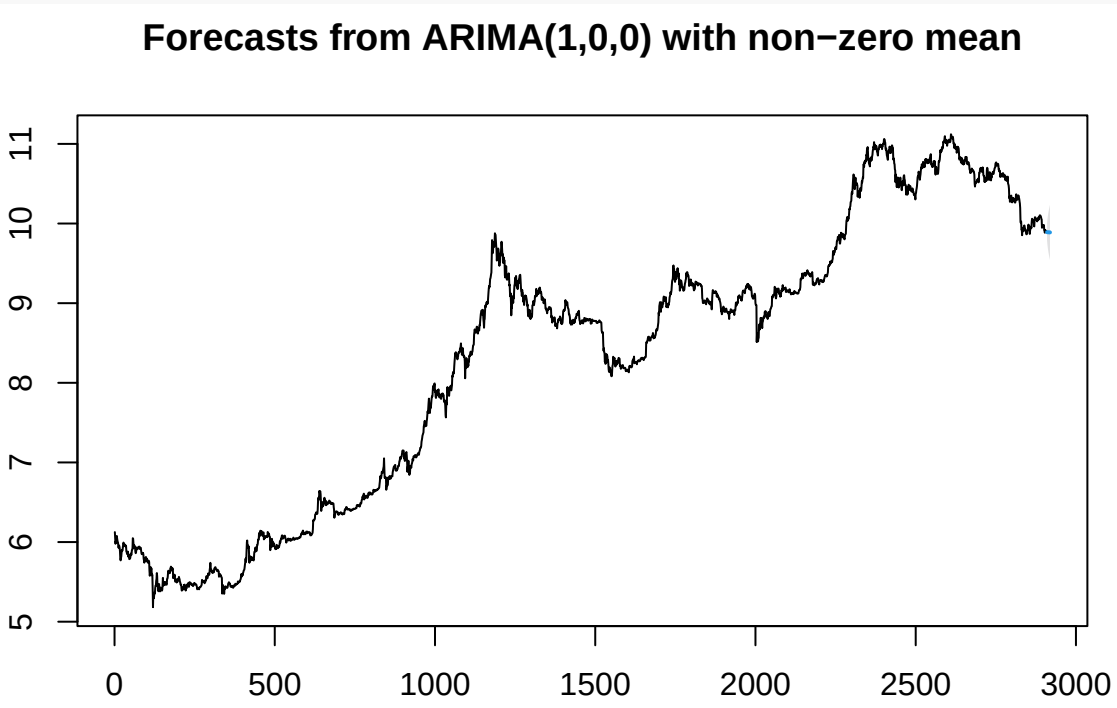
```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## 0.0000138 0.0062463 0.0159076 0.0256139 0.0344094 0.4645829
```

```
modelo_1_pred <-forecast::forecast(modelo_1,h=10, level=c(99.5))
modelo_1_pred
```

```
##      Point Forecast  Lo 99.5  Hi 99.5
## 2910       9.891742 9.782241 10.00124
## 2911       9.891391 9.736551 10.04623
## 2912       9.891041 9.701423 10.08066
## 2913       9.890691 9.671763 10.10962
## 2914       9.890341 9.645599 10.13508
```

```
## 2915       9.889991 9.621919 10.15806
## 2916       9.889641 9.600123 10.17916
## 2917       9.889291 9.579817 10.19877
## 2918       9.888942 9.560731 10.21715
## 2919       9.888592 9.542666 10.23452
```

```
plot(modelo_1_pred)
```




```
# Modelo AR(2)
modelo_2=arima(BTC_USD_log, order=c(2,0,0))
modelo_2
```

```
##
## Call:
## arima(x = BTC_USD_log, order = c(2, 0, 0))
##
## Coefficients:
##          ar1     ar2  intercept
##       0.9815  0.0183     8.3116
## s.e.  0.0185  0.0185     1.6411
##
## sigma^2 estimated as 0.001521:  log likelihood = 5305.6,  aic = -10603.19
```

```
coeftest(modelo_2)
```

```
##
## z test of coefficients:
##
##           Estimate Std. Error z value  Pr(>|z|)
## ar1       0.981490   0.018547 52.9189 < 2.2e-16 ***
## ar2       0.018293   0.018550  0.9861    0.3241
## intercept 8.311645   1.641087  5.0647  4.09e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
confint(modelo_2)
```

```
##                 2.5 %      97.5 %
## ar1        0.94513855  1.01784163
## ar2       -0.01806437  0.05464959
## intercept  5.09517371 11.52811555
```

```
AIC(modelo_2)
```

```
## [1] -10603.19
```

```
BIC(modelo_2)
```

```
## [1] -10579.29
```

```
e2=residuals(modelo_2)
summary(e2)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## -0.464582 -0.013570  0.001731  0.001303  0.017805  0.228716
```

```
absserr_2=abs(e2)
summary(absserr_2)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## 0.0000246 0.0062163 0.0158624 0.0255839 0.0341662 0.4645819
```