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Econ 108

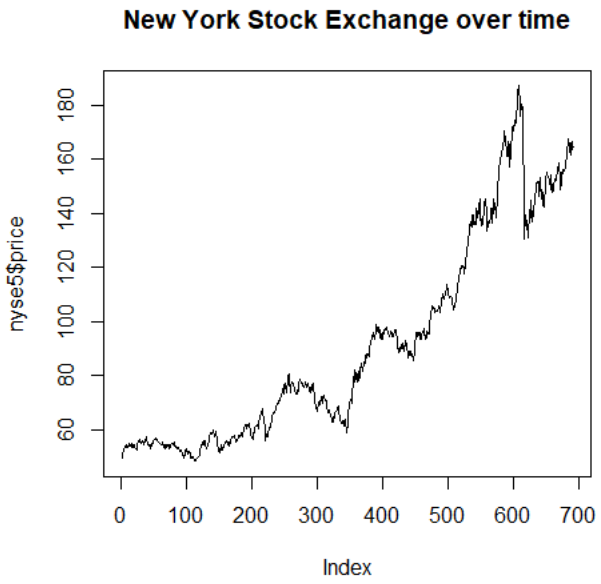
October 28, 2022

Problem Set 4

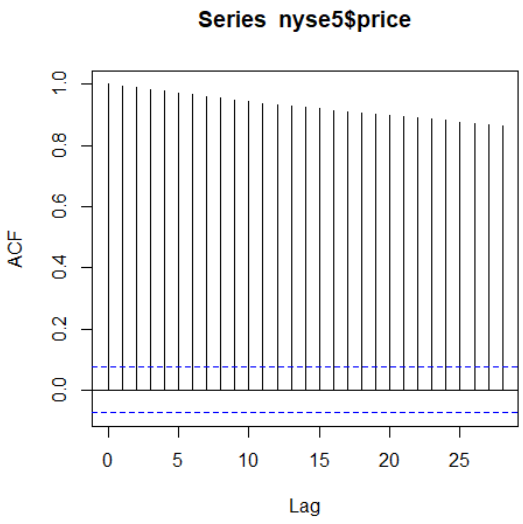
1)

a) done

b) The price index time series appears to be a unit root process.



c) The ACF remains persistent over time.



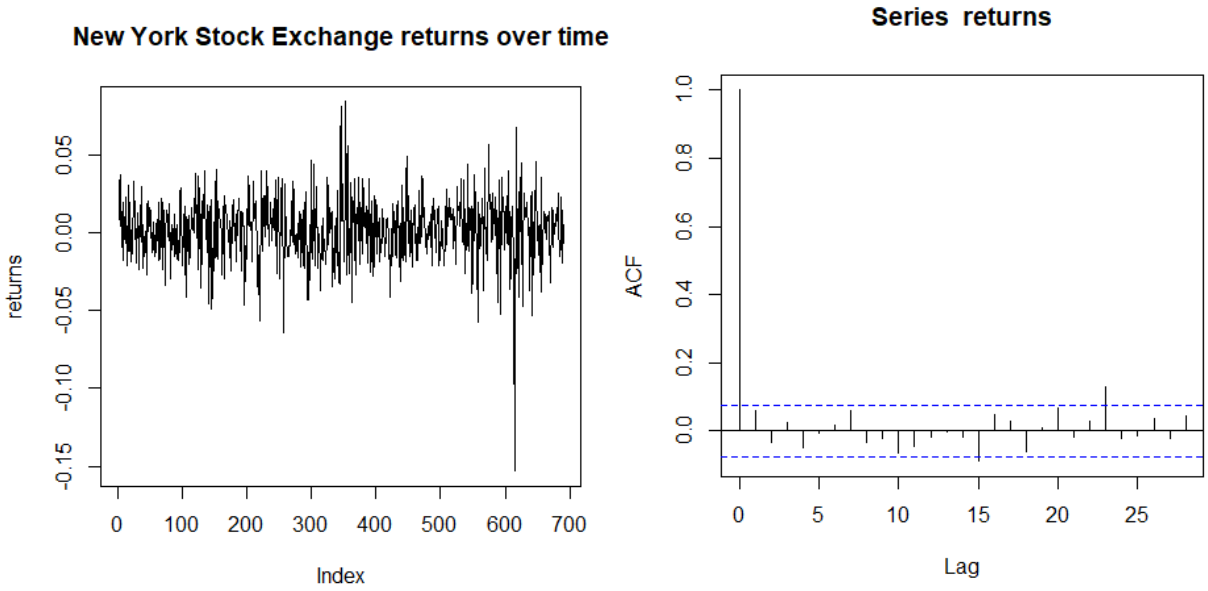
d) No, you cannot reject the null hypothesis, as β_1 is very close to 1.

```
Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)         0.172732   0.230119   0.751    0.453
nyse5[1:(n - 1), ] 0.999926   0.002324 430.270   <2e-16 ***
```

e)

```
Coefficients:
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)         0.0017963  0.0008074   2.225   0.0264 *
returns[1:(n - 2)] 0.0588985  0.0380231   1.549   0.1218
```

f) The return time series appear to be stationary.



g)

```
Coefficients:
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)         0.0017963  0.0008074   2.225   0.0264 *
returns[1:(n - 2)] 0.0588985  0.0380231   1.549   0.1218
```

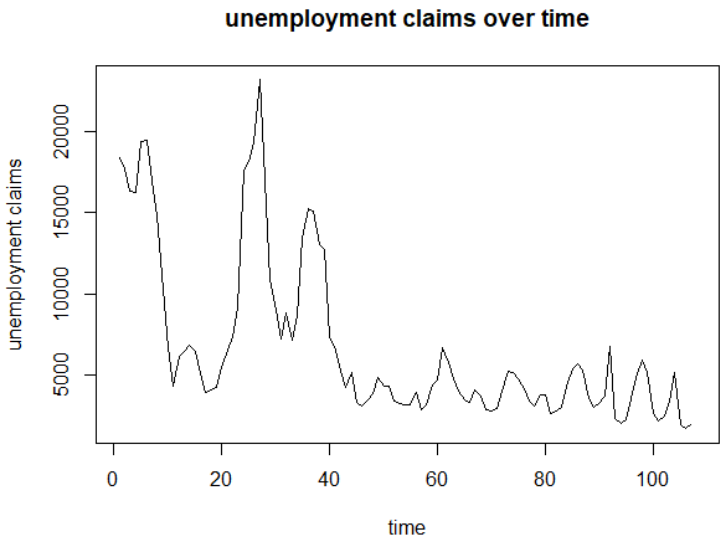
h) Yes, the standard deviations change visibly, as ".0724" > ".0380".

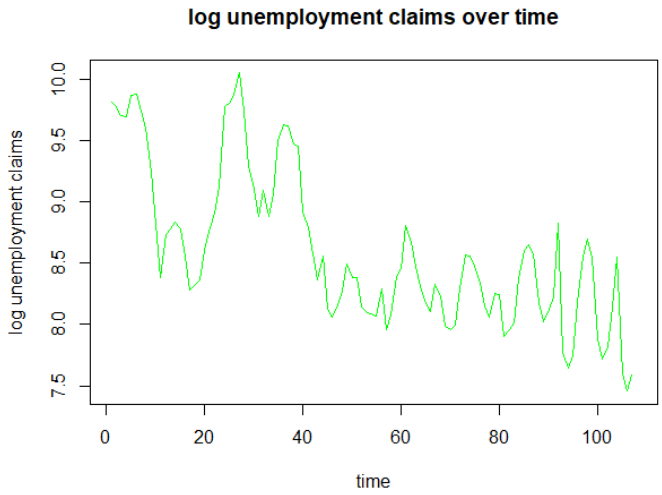
```
> bvar <- vcovHC(ARreturns)
> round(bvar, 1)
                   (Intercept) returns[1:(n - 2)]
(Intercept)                  0                  0
returns[1:(n - 2)]           0                  0
> sqrt(bvar["returns[1:(n - 2)]", "returns[1:(n - 2)]"])
[1] 0.07248599
```

2)

a) done

b) The log is better modeled by the linear regression model, because a time trend is more visible. Over time, unemployment claims have decreased, but have regular spikes.



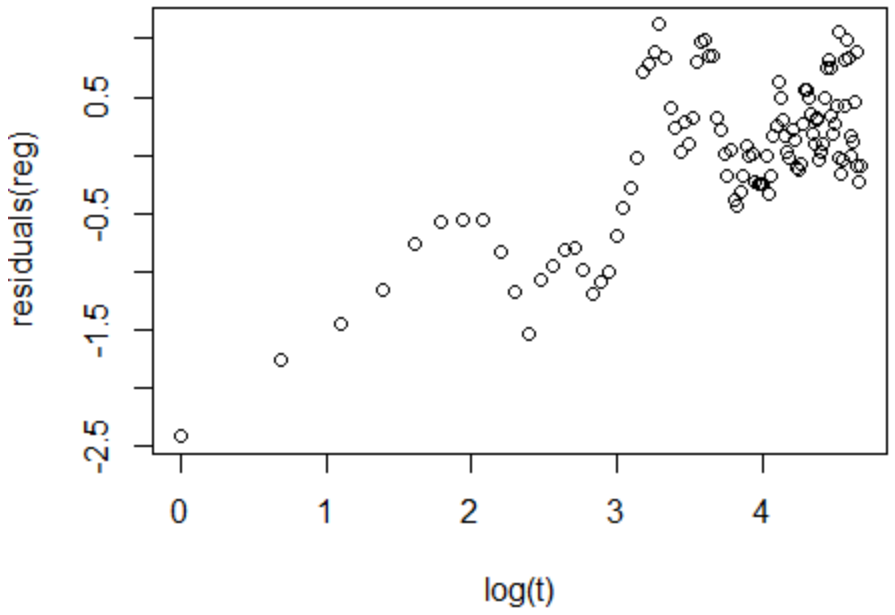


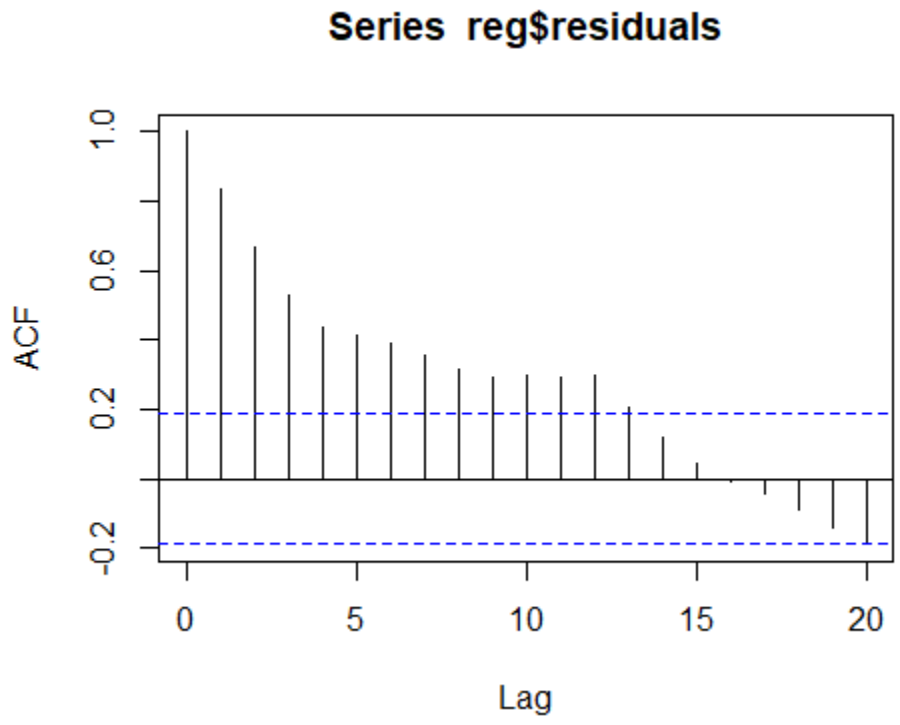
c)

```
Call:  glm(formula = log(t) ~ log(unemployment), data = ezanders5)

Coefficients:
      (Intercept)  log(unemployment)
            12.73              -1.05
```

d) The first graph shows serial persistence over time. The second graph shows there is significant dependence.

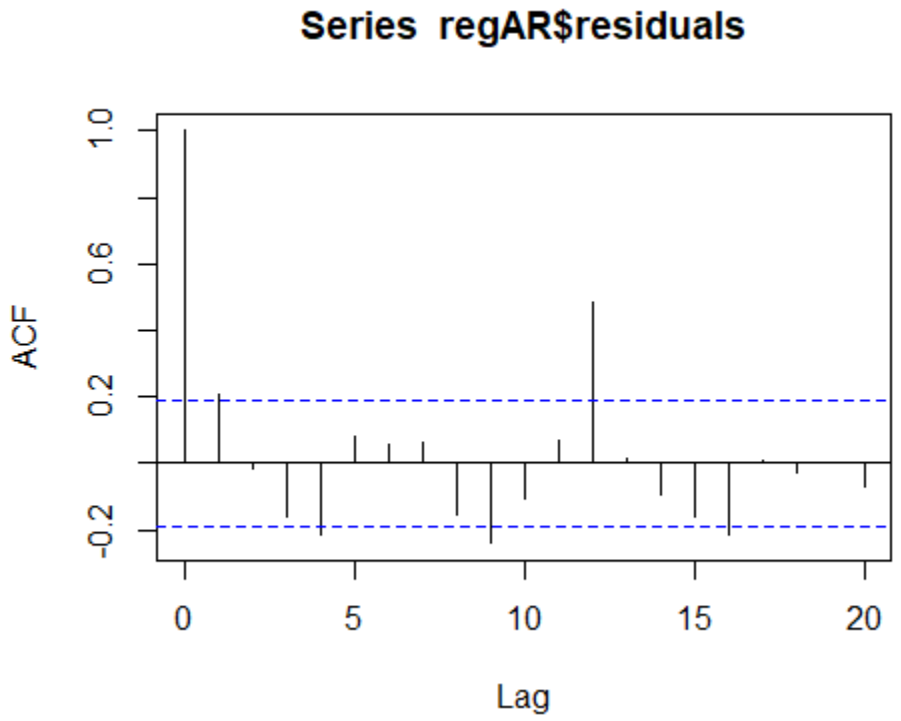

residuals(reg)
0.5
-0.5
-1.5
-2.5
0
1
2
3
4
log(t)


Series reg$residuals
ACF
1.0
0.6
0.2
-0.2
0
5
10
15
20
Lag

e)

```
Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.822003   0.547734   3.326  0.00122 **
t           -0.002712   0.001177  -2.304  0.02322 *
lag          0.803004   0.058080  13.826  < 2e-16 ***
---
```

f) The augmented regression reduces serial persistence of the residuals over time.



g) The enterprise zone has an effect on the unemployment claims.

```
Coefficients:
      (Intercept)  log(unemployment)             ezTRUE
           7.7695            -0.5331             0.9365
```