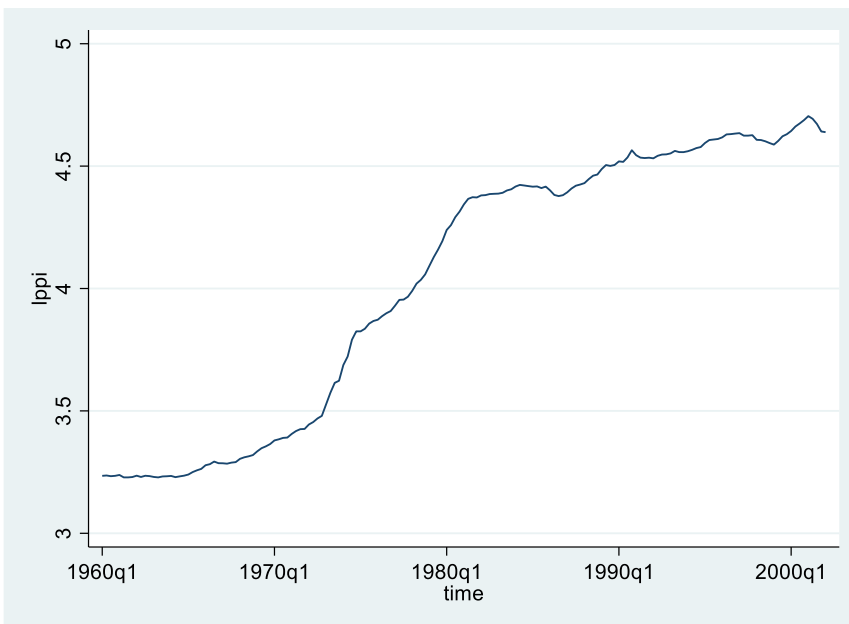# Miguel Alejandro García Navarro

1919323

Practical 2

```
. use ppi

. tsset time

Time variable: time, 1960q1 to 2002q1
        Delta: 1 quarter

. gen lppi=log(ppi)

. gen dlppi=d.lppi
(1 missing value generated)

.
. tsline lppi

. ac lppi

. pac lppi
```

The time series is created, and the log of the Producer Price Index is plotted.

From the image, it does not seem to be stationary.

Bartlett's formula for MA(q) 95% confidence bands

95% Confidence bands [se = 1/sqrt(n)]
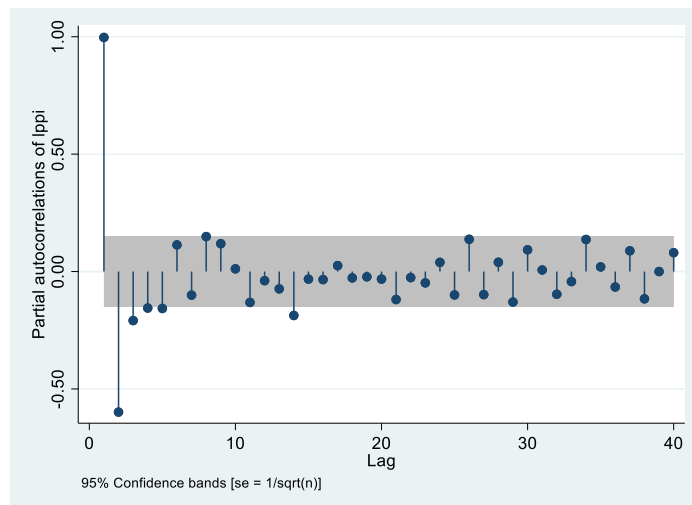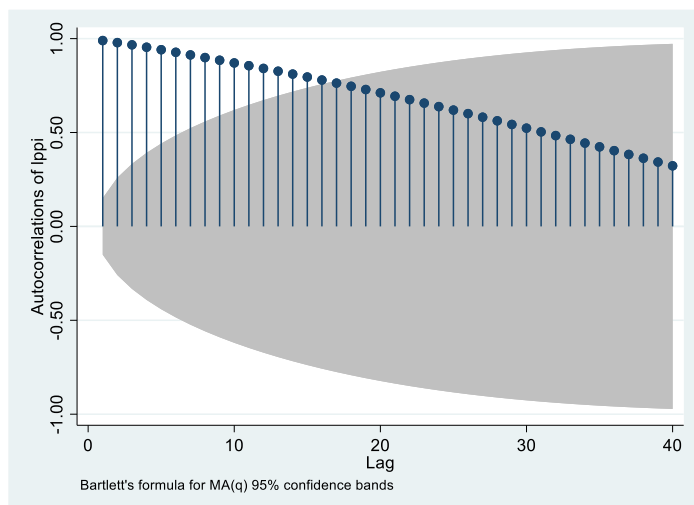
```
quietly regress dlppi l.lppi time l(1/12).dlppi

test l9.dlppi l10.dlppi l11.dlppi l12.dlppi

( 1)  L9.dlppi = 0
( 2)  L10.dlppi = 0
( 3)  L11.dlppi = 0
( 4)  L12.dlppi = 0

      F(  4,   141) =    0.78
           Prob > F =    0.5404
```

```
quietly regress dlppi l.lppi time l(1/8).dlppi

test l5.dlppi l6.dlppi l7.dlppi l8.dlppi

( 1)  L5.dlppi = 0
( 2)  L6.dlppi = 0
( 3)  L7.dlppi = 0
( 4)  L8.dlppi = 0

      F(  4,   149) =    2.07
           Prob > F =    0.0877
```

Another regression is run, this time only using lags 1 to 8 of the first difference. A hypothesis test shows that lags 5 to 8 are statistically significant for a 10% confidence level.

```
.
. predict resid, r
(9 missing values generated)

. tsline resid

. ac resid

. pac resid

. corrgram resid, lags(20)
```
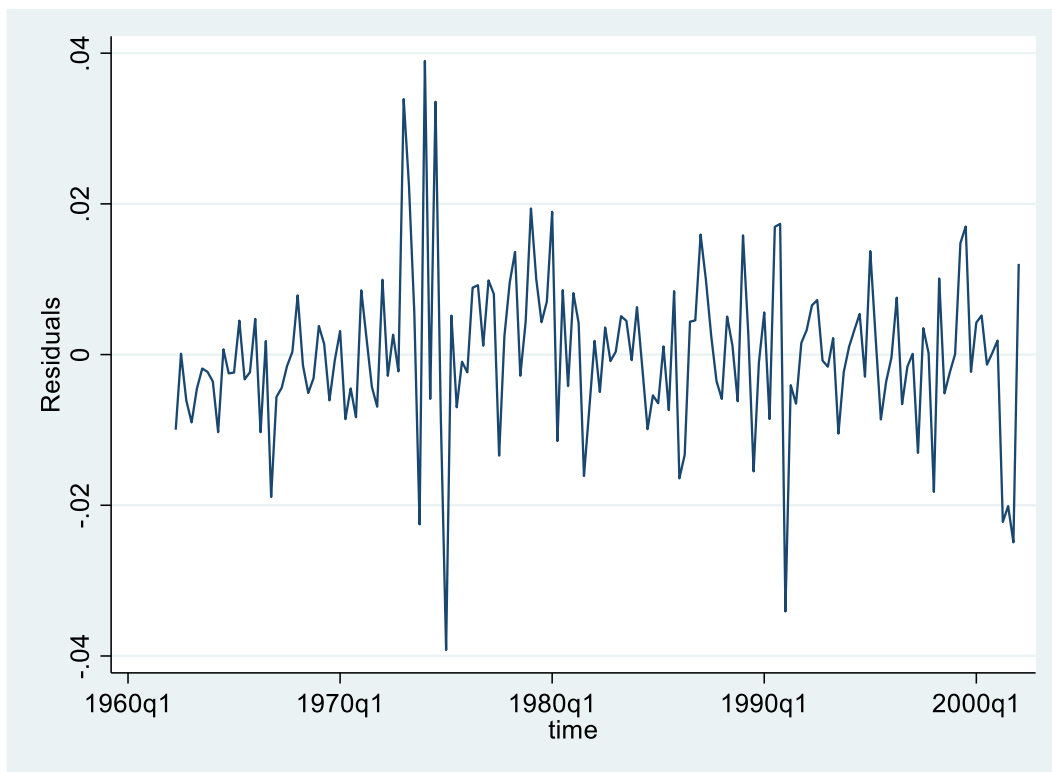

Residuals are plotted, and seem to be white-noise process, which is always stationary.

Bartlett's formula for MA(q) 95% confidence bands

95% Confidence bands [se = 1/sqrt(n)]
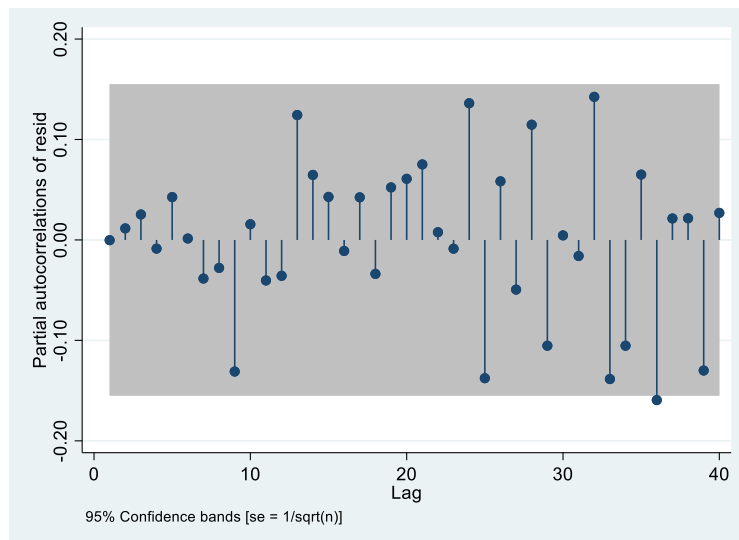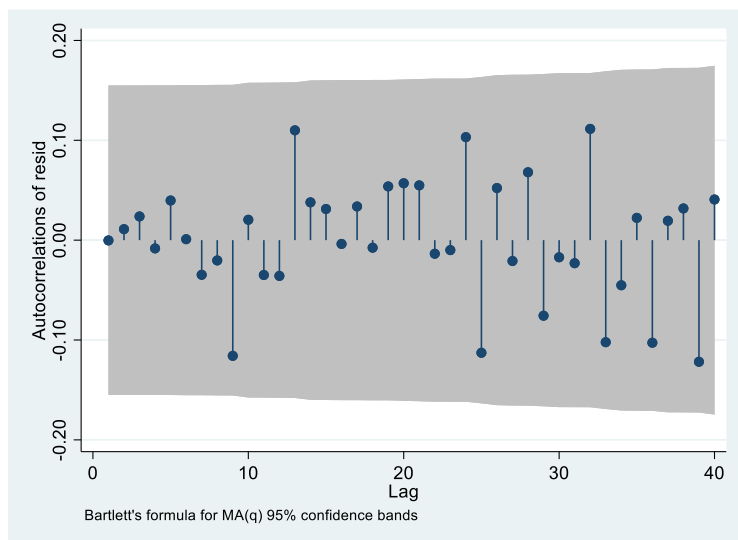
==AC and PAC of the residuals indicate zero autocorrelation, which also points to a white noise process.==

```
. corrgram resid, lags(20)
```

| | | | | | -1   0   1 | -1   0   1 |
LAG	AC	PAC	Q	Prob>Q	[Autocorrelation]	[Partial autocor]
1	-0.0003	-0.0002	1.3e-05	0.9971		
2	0.0111	0.0115	.02005	0.9900		
3	0.0237	0.0254	.1131	0.9902		
4	-0.0083	-0.0087	.12445	0.9981		
5	0.0397	0.0427	.38804	0.9957		
6	0.0010	0.0014	.3882	0.9989		
7	-0.0347	-0.0384	.5921	0.9990		
8	-0.0203	-0.0279	.66248	0.9996		
9	-0.1159	-0.1310	2.9672	0.9656		
10	0.0204	0.0156	3.0391	0.9805		
11	-0.0349	-0.0403	3.2511	0.9870		
12	-0.0358	-0.0357	3.4756	0.9912		
13	0.1100	0.1243	5.6089	0.9592		
14	0.0379	0.0647	5.8635	0.9698		
15	0.0312	0.0429	6.0378	0.9791		
16	-0.0038	-0.0110	6.0403	0.9877		
17	0.0337	0.0424	6.2465	0.9914		
18	-0.0076	-0.0338	6.257	0.9950		
19	0.0538	0.0523	6.7894	0.9953		
20	0.0570	0.0608	7.391	0.9952		

```
. dfuller lppi, trend lags(8)

Augmented Dickey-Fuller test for unit root

Variable: lppi                                   Number of obs  = 160
                                                 Number of lags =   8

H0: Random walk with or without drift

                                      Dickey-Fuller
                   Test         ———— critical value ————
                   statistic       1%          5%         10%
    ─────────────────────────────────────────────────────────
    Z(t)           -0.309       -4.020      -3.442      -3.142

MacKinnon approximate p-value for Z(t) = 0.9893.
```

An ADF test, with trend, is applied to the log of the ppi, null hypothesis that it is a unit proof process cannot be rejected.

```
. dfuller lppi, lags(8)

Augmented Dickey-Fuller test for unit root

Variable: lppi                                   Number of obs  = 160
                                                 Number of lags =   8

H0: Random walk without drift, d = 0

                                      Dickey-Fuller
                   Test         ———— critical value ————
                   statistic       1%          5%         10%
    ─────────────────────────────────────────────────────────
    Z(t)           -1.421       -3.490      -2.886      -2.576

MacKinnon approximate p-value for Z(t) = 0.5724.
```

An ADF test without trend is applied to the log of the ppi; once again, the null hypothesis that it is a unit proof process cannot be rejected.

There is strongly statistical evidence that the log of the Producer Price Index is a Unit Proof Process. To make it stationary, first-differences need to be obtained.
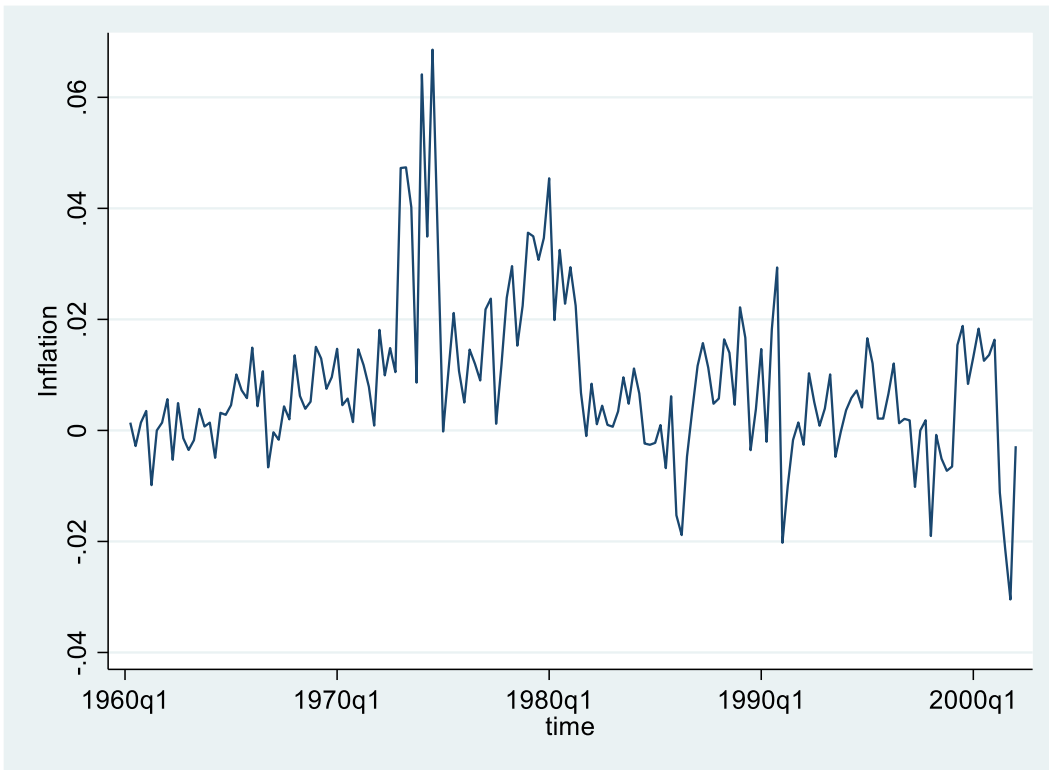
```
rename dlppi inf

label var inf "Inflation"


tsline inf

ac inf

pac inf
```
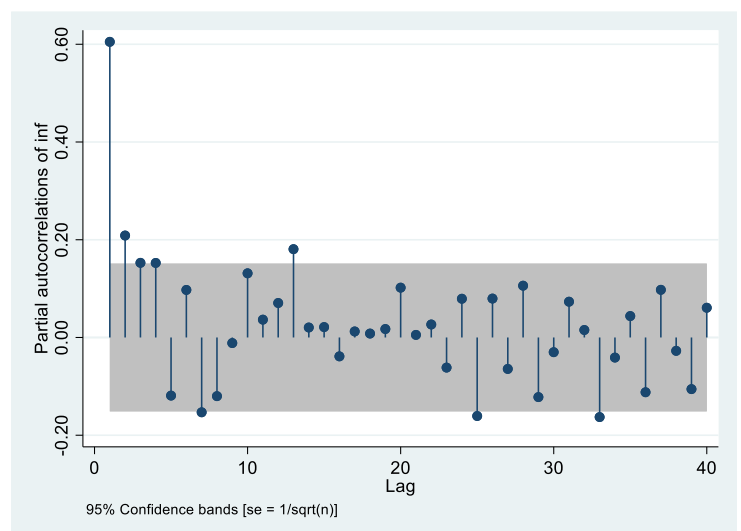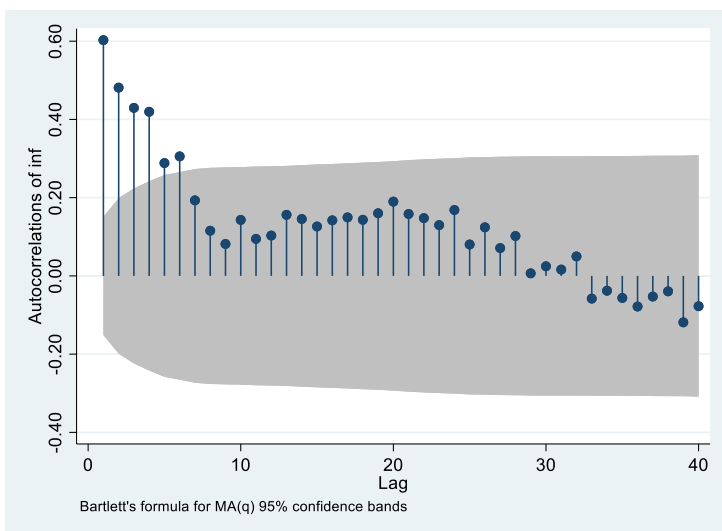
The series is renamed as Inflation.

Its plot suggest that it might be a stationary process.

```
. dfuller inf, trend lags(8)

Augmented Dickey-Fuller test for unit root

Variable: inf                              Number of obs   = 159
                                           Number of lags =   8

H0: Random walk with or without drift

                                    Dickey-Fuller
                    Test            critical value
                 statistic       1%         5%          10%

 Z(t)              -3.458       -4.020     -3.442      -3.142

MacKinnon approximate p-value for Z(t) = 0.0441.
```

==The ADF test with trend indicates there is statistical evidence that the process of the variable Inflation is stationary.==

```
. dfuller inf, lags(8)

Augmented Dickey-Fuller test for unit root

Variable: inf                              Number of obs   = 159
                                           Number of lags =   8

H0: Random walk without drift, d = 0

                                    Dickey-Fuller
                    Test            critical value
                 statistic       1%         5%          10%

 Z(t)              -3.202       -3.490     -2.886      -2.576

MacKinnon approximate p-value for Z(t) = 0.0198.
```

==The ADF test without trend also indicates that the series is a stationary process.==

==It can be concluded that the log of the Producer Price Index is not stationary, but the first-difference of the series is.==