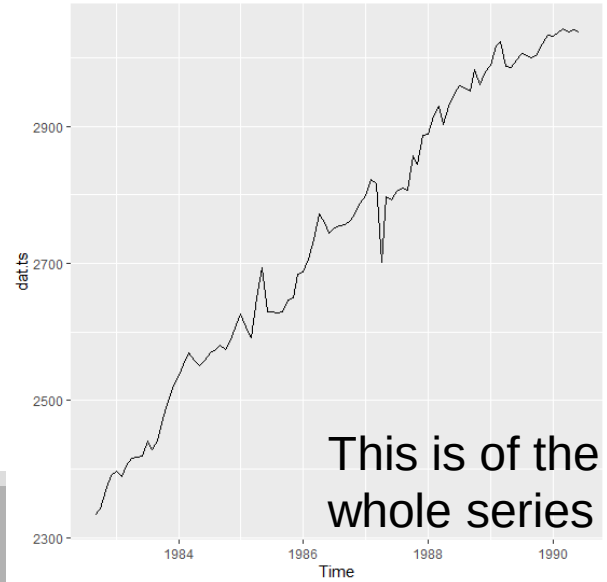
Example

Take a look at the whole process one more time….

Data consume1982.csv provides disposable spending in 1982 dollars (the units are in billions of dollars!!)

The data starts in September 1982 and goes to June 1990

- Training data set consists of 70 observations (September 1982 – June 1988)
- Validation data set consists of 12 observations (July 1988 – June 1989)
- Test data set consists of 12 observations (July 1989 – June 1990)



Looks like it is a Random Walk with drift

```
Type 3: with drift and trend
     lag   ADF p.value
[1,]   0 -4.40  0.0100
[2,]   1 -3.66  0.0347
[3,]   2 -3.02  0.1585
```

Creating Models

Going to create a model using auto.arima (Model 1) then one on my own (Model2)

Using auto.arima….

ARIMA(0,1,1)

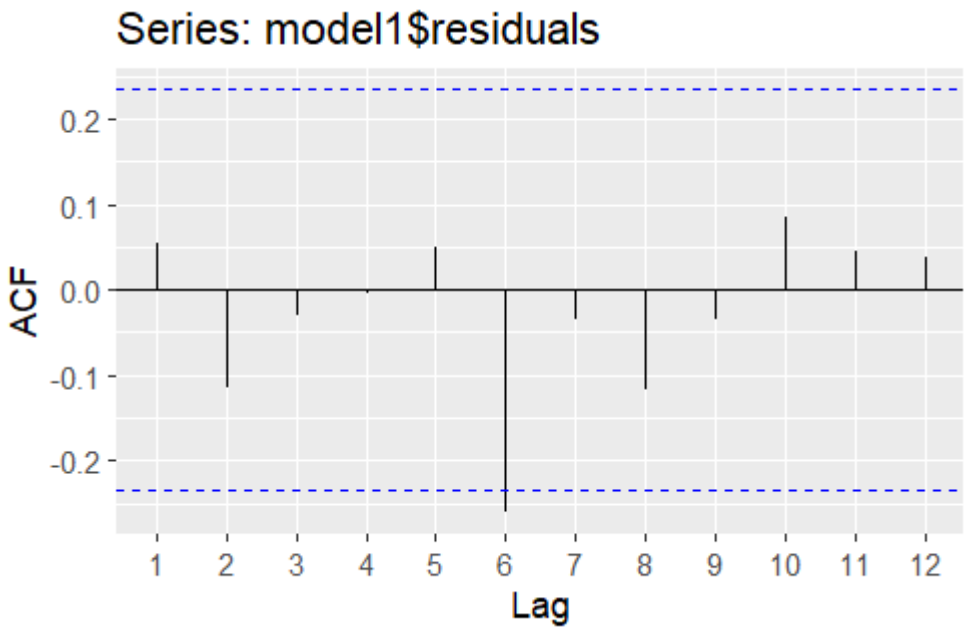
Coefficients:

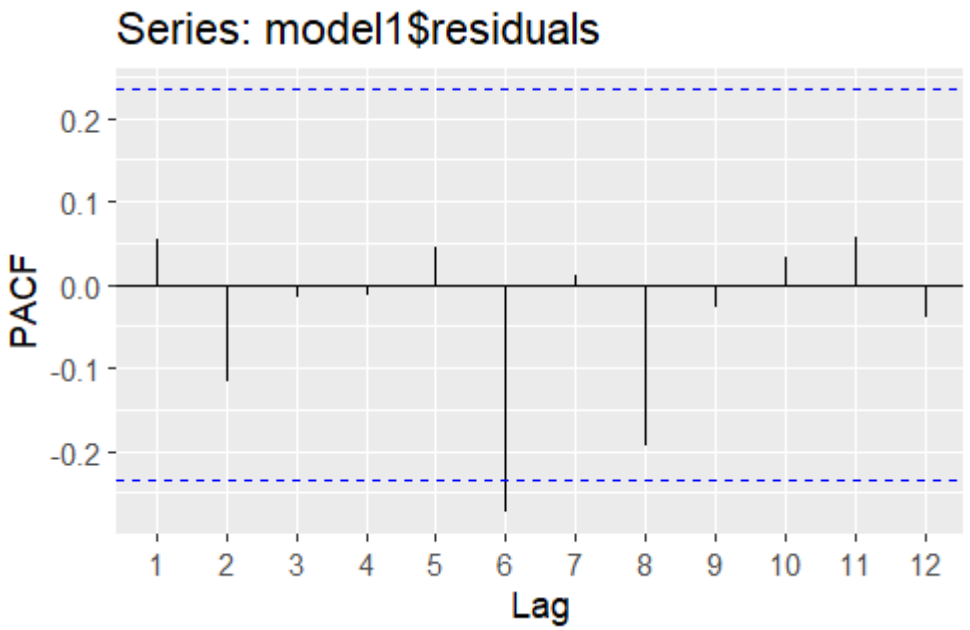
	ma1	drift
	-0.4362	8.7689
s.e.	0.1298	1.6818

sigma^2 estimated as 617.5: log likelihood=-318.68
AIC=643.36   AICc=643.73   BIC=650.06

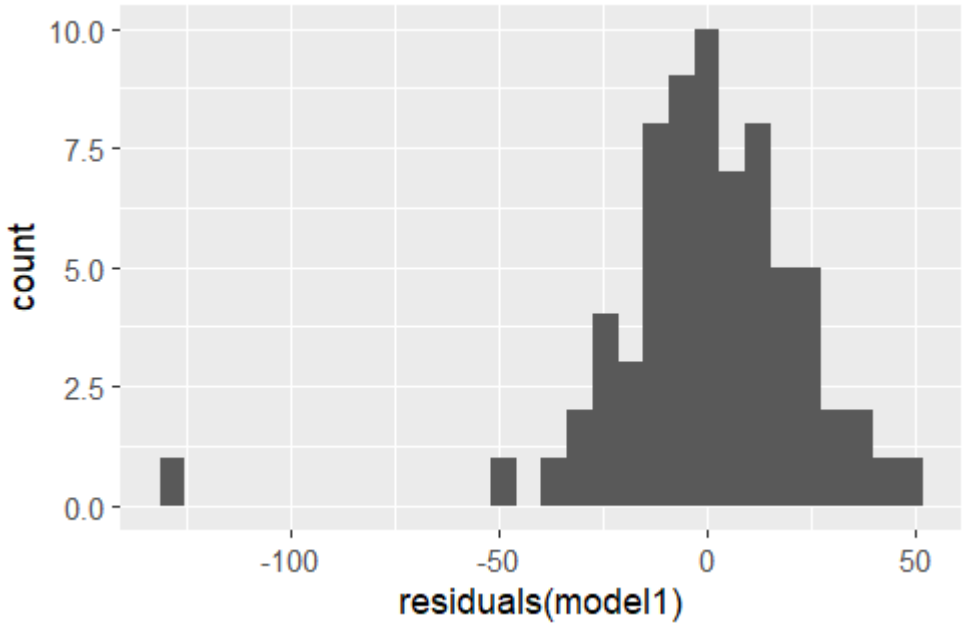
MAE	MPE	MAPE
16.604	0.002439733	0.6241532

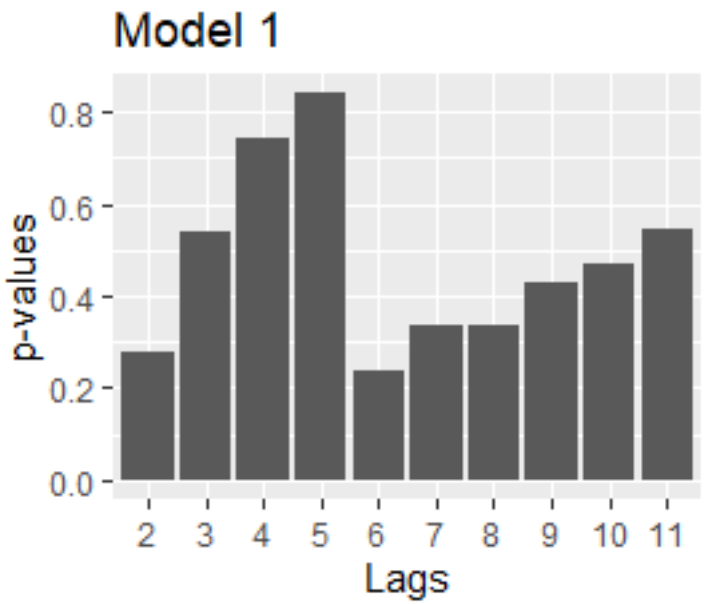
Didn’t do bad, but potentially there are still lags



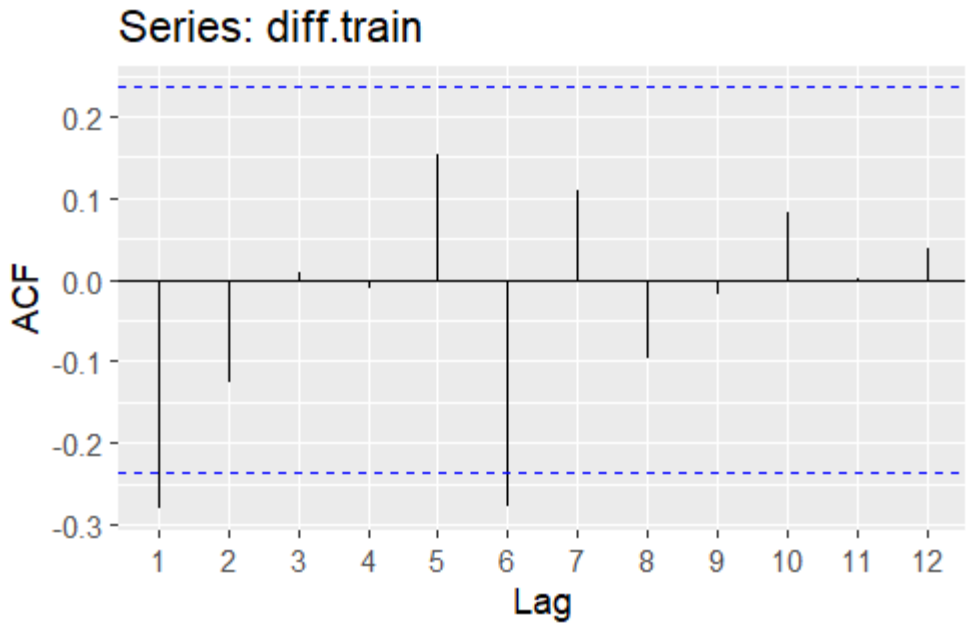


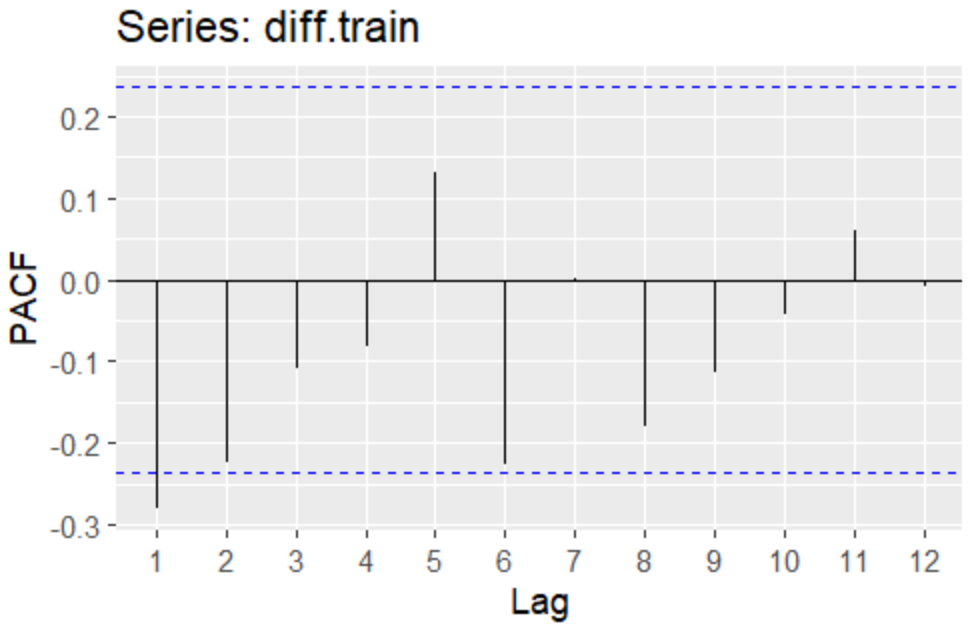
Not bad for white noise (alas, do have a pretty big outlier…the big dip down in April of 1987)





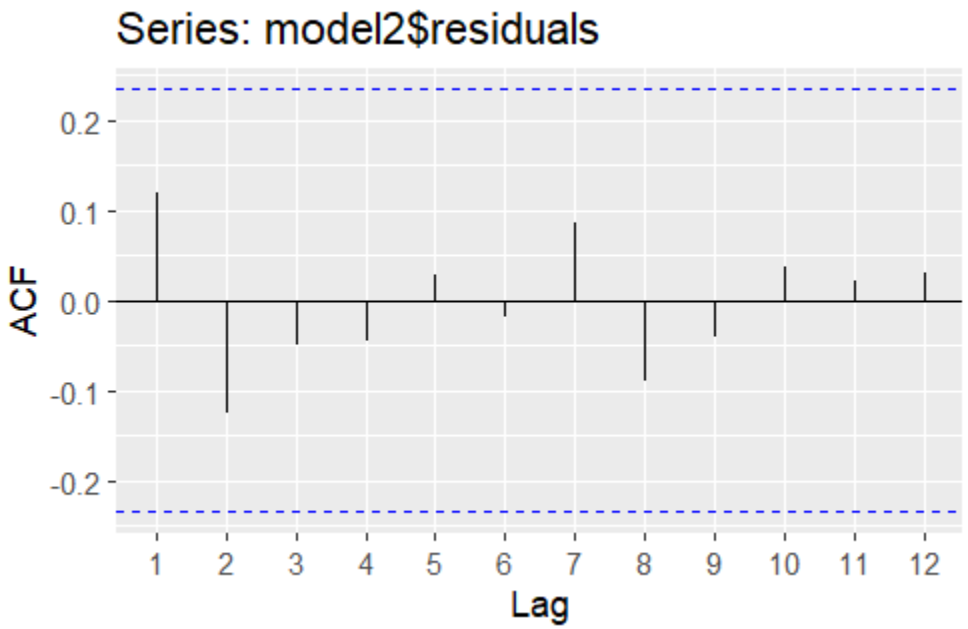
Now try one by hand…first look at ACF and PACF of differences…

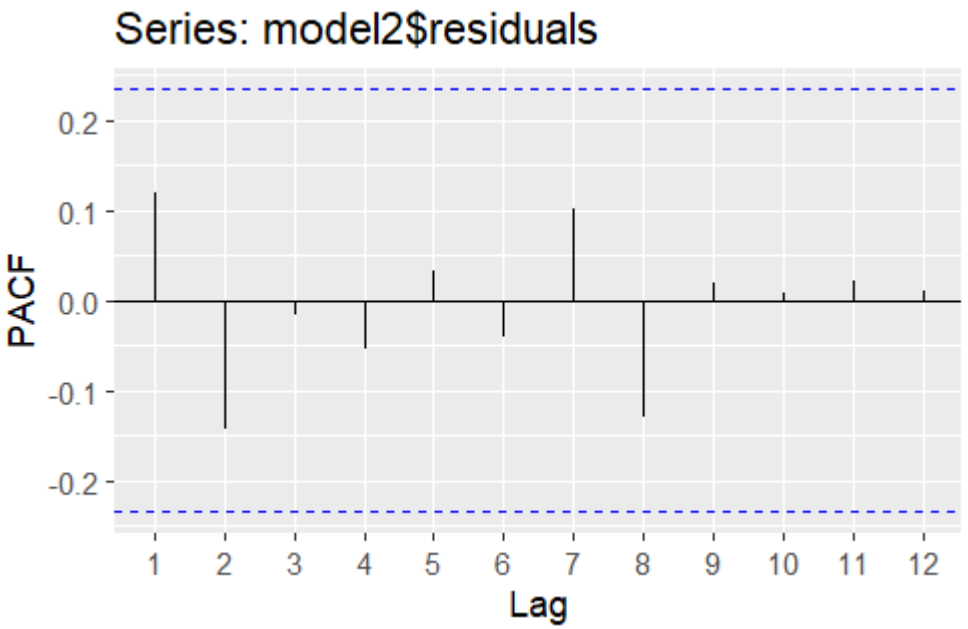


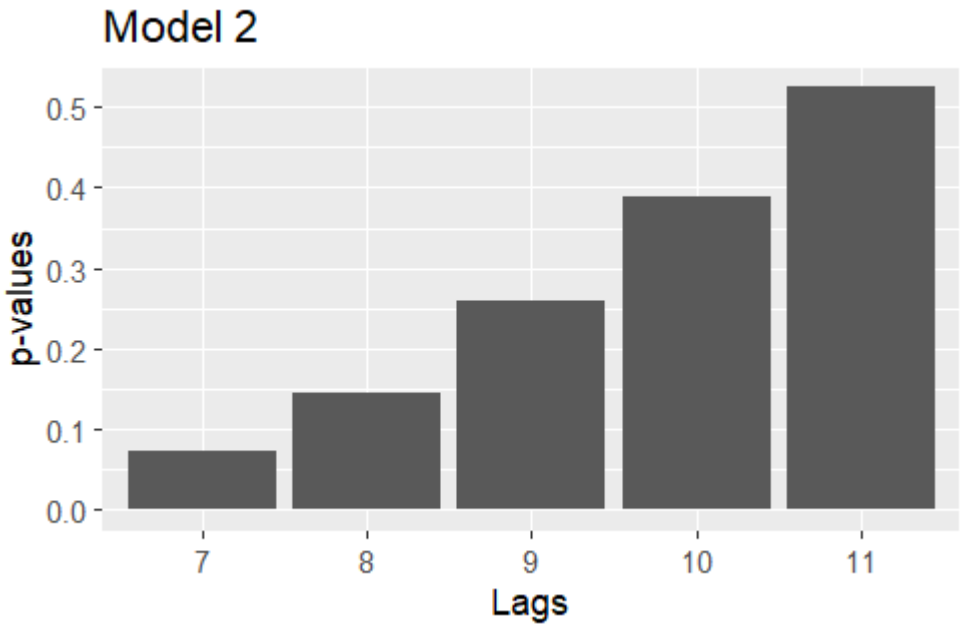


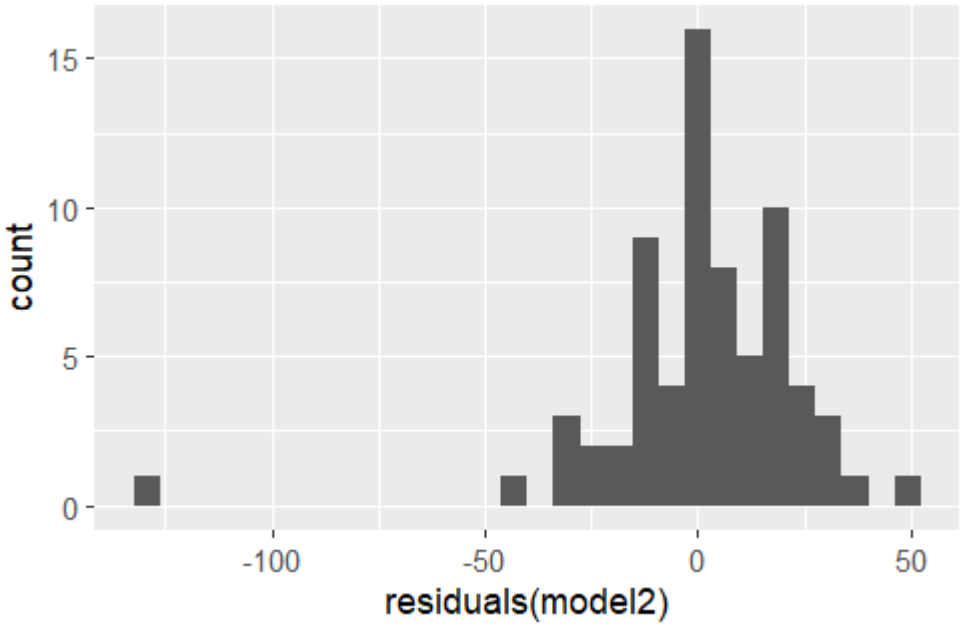
```
model2=Arima(train.ts,order=c(0,1,6),include.drift = T, fixed=c(NA,0,0,0,0,NA,NA))


Series: train.ts
ARIMA(0,1,6) with drift

Coefficients:
          ma1      ma2  ma3  ma4  ma5      ma6      drift
      -0.5556    0      0       0       0    -0.2935    8.2303
s.e.   0.1763    0      0       0       0     0.1083    0.6218

sigma^2 estimated as 562.1:  log likelihood=-315.5
AIC=638.99   AICc=639.62   BIC=647.93
```

MAE	MPE	MAPE
15.08845	0.05253814	0.5687325


Series: model2$residuals
ACF
0.2
0.1
0.0
-0.1
-0.2
1
2
3
4
5
6
7
8
9
10
11
12
Lag


Series: model2$residuals
PACF
0.2
0.1
0.0
-0.1
-0.2
1
2
3
4
5
6
7
8
9
10
11
12
Lag


Model 2
p-values
0.0
0.1
0.2
0.3
0.4
0.5
7
8
9
10
11
Lags


count
0
5
10
15
-100
-50
0
50
residuals(model2)

MAPE.1	MAE
0.006836268	20.3882
MAPE.2	MAE
0.005492793	16.4175