

時間數列 PRESENTATION

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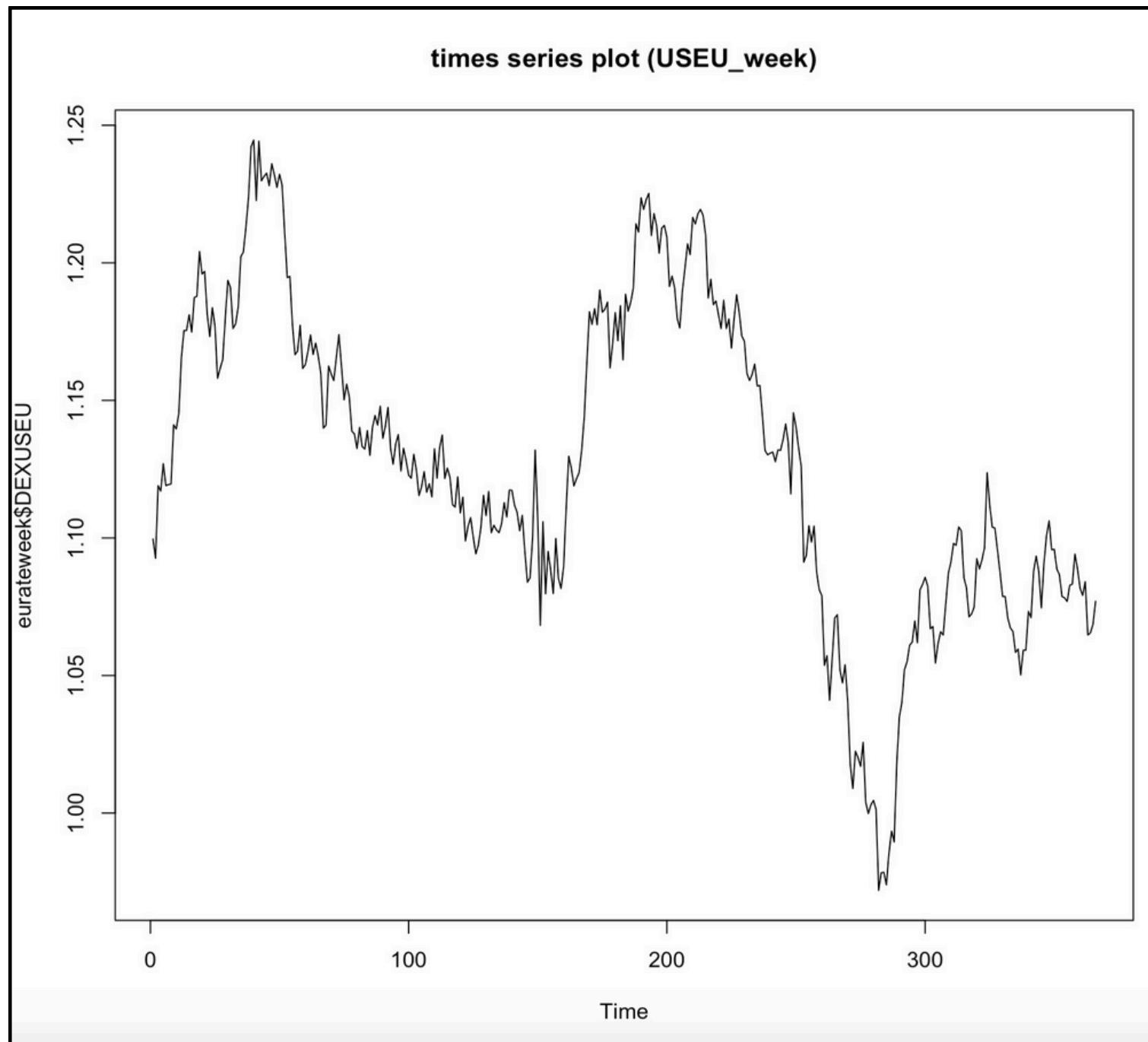
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模型預測

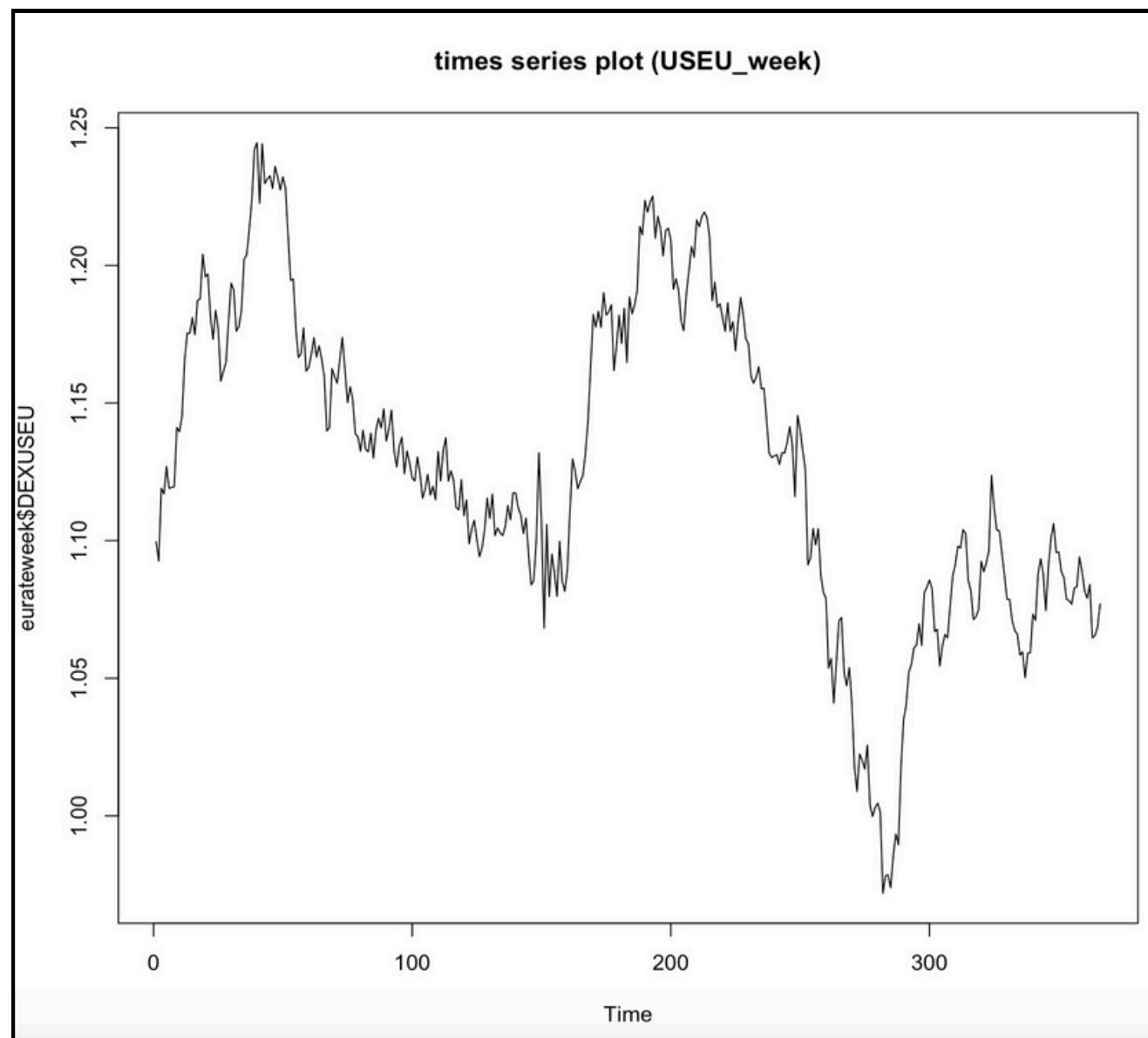
歐元兌美元之匯率時間數列圖



U.S. DOLLARS TO EURO SPOT EXCHANGE RATE

- 資料時長：2017/5~2024/5
- 資料筆數：以週為單位，共 366 筆
- 資料型態：Numerical

穩定性檢測 ADF TEST



U.S. DOLLARS TO EURO SPOT EXCHANGE RATE

H_0 : 此時間數列不具平穩性 H_1 : 此時間數列具平穩性

```
> adf.test(eurateweek$DEXUSEU)
```

Augmented Dickey-Fuller Test

data: eurateweek\$DEXUSEU

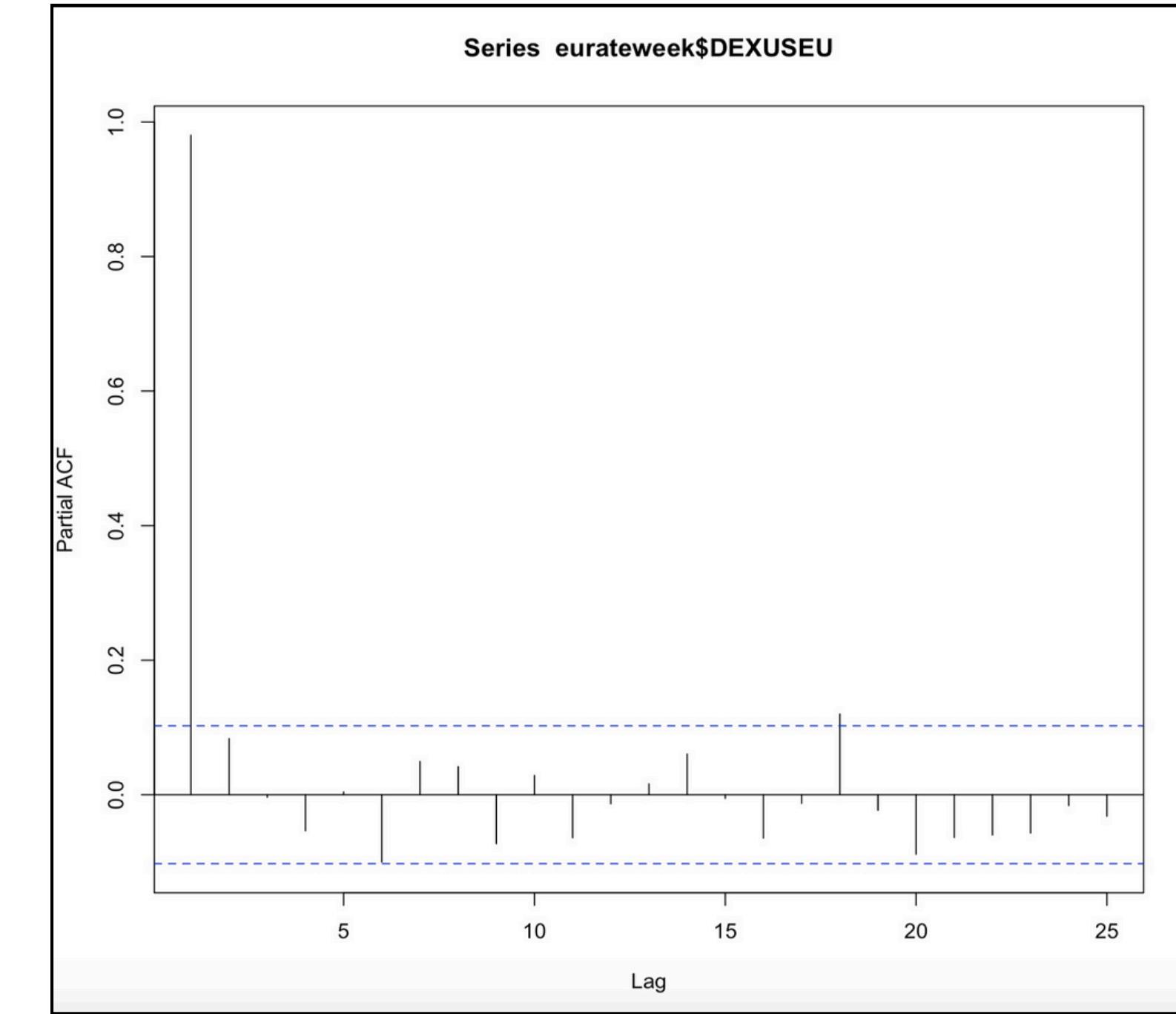
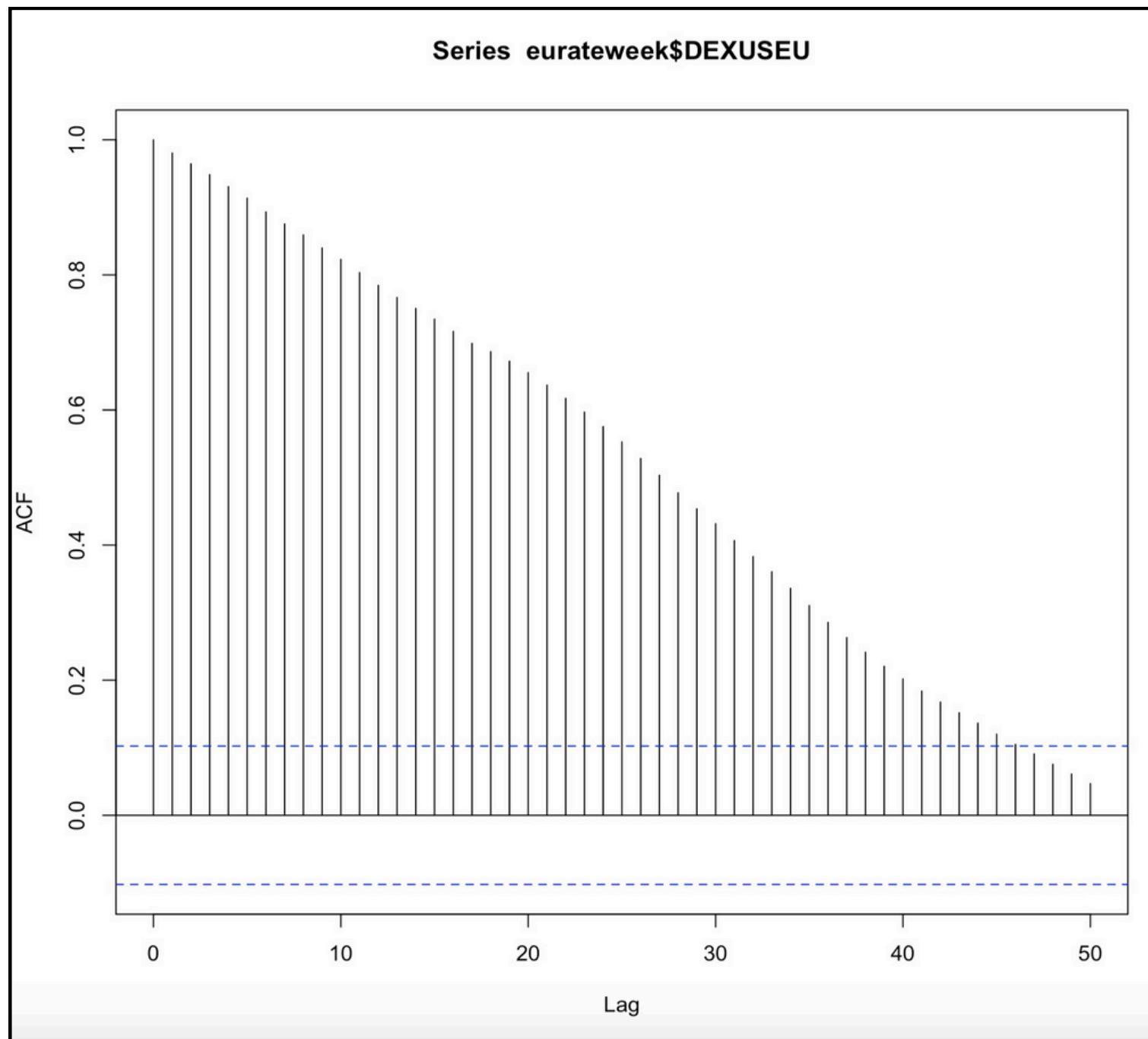
Dickey-Fuller = -2.4516, Lag order = 7, p-value = 0.3863

alternative hypothesis: stationary

▲ P-value 為 0.3863，沒有小於 0.01，沒有拒絕 H_0

判定此數據不具平穩性

ACF / PACF



REGRESSION DETREND

- 用 ADF Test 驗證穩定性

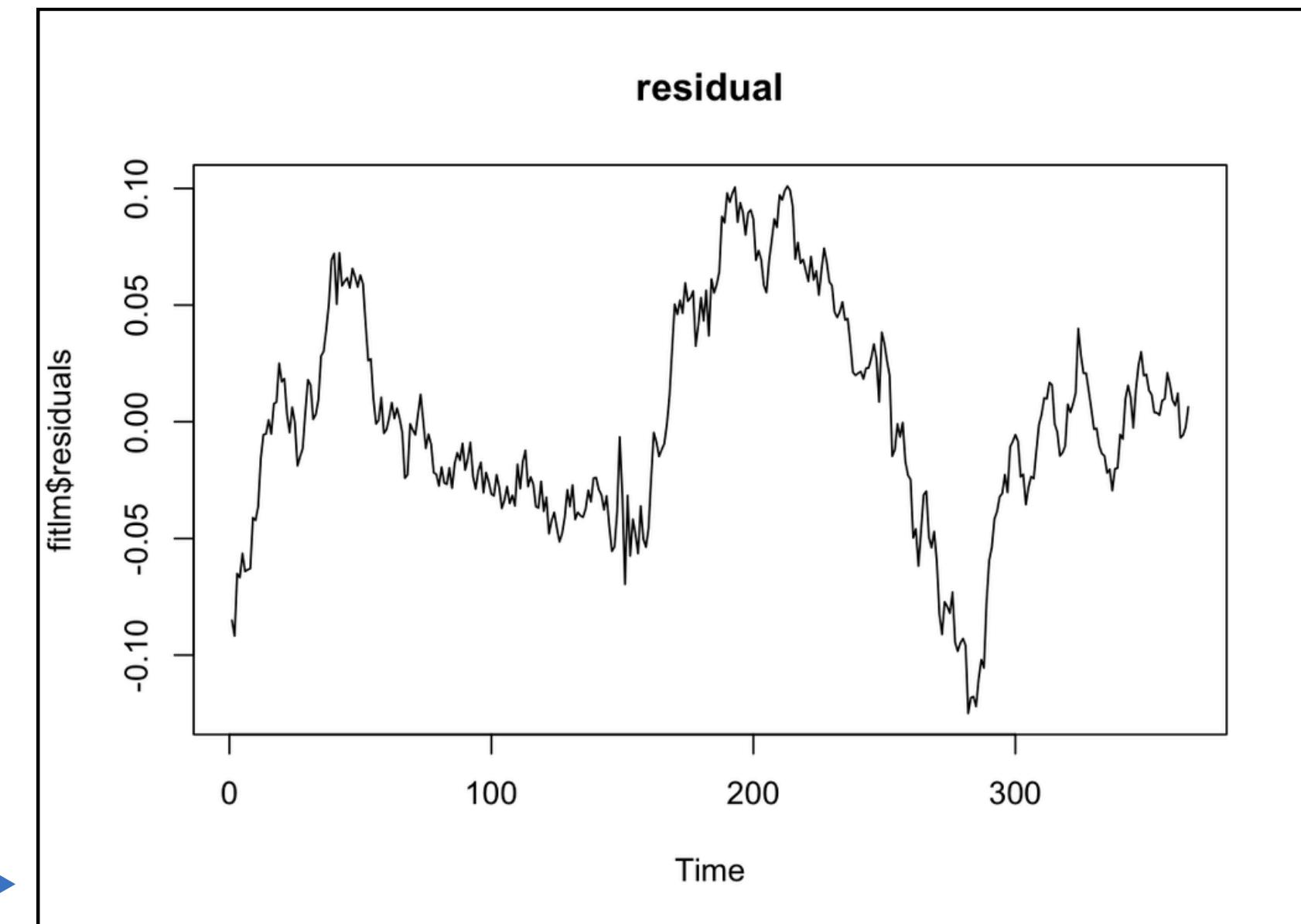
lag = 1時，使用單次項迴歸 (t^1) 進行detrend

adf test檢測後顯示殘差p value = 0.3863



non stationary

residuals time series plot (detrend : t^1)

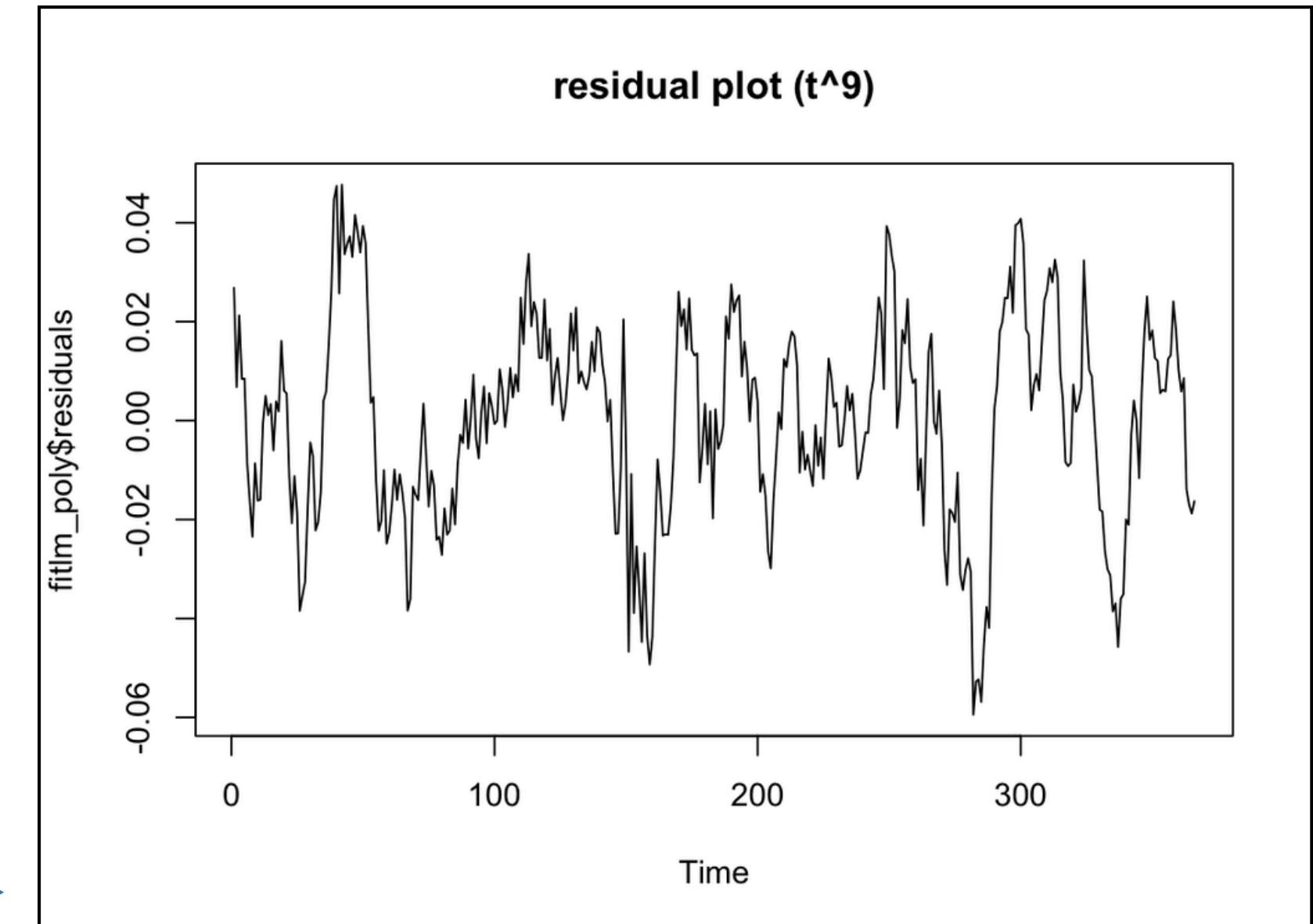


REGRESSION DETREND

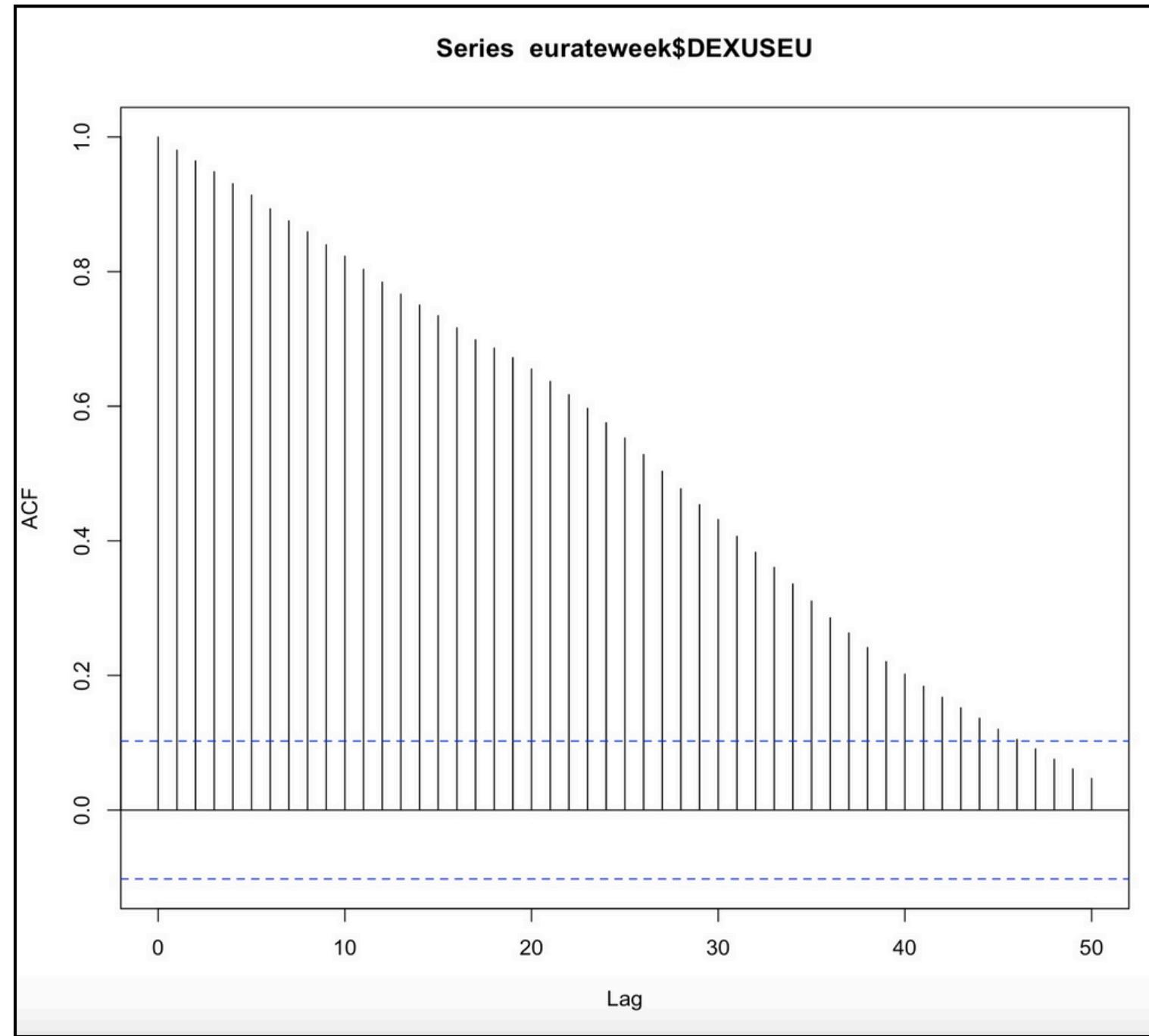
- 用 ADF Test 驗證穩定性

$\text{lag} = 1$ 時，使用多次項迴歸，直到 t^9 時殘差才為stationary，由於次方太大易有overfitting的問題，因此**不使用regression detrend**

residuals time series plot (detrend : t^1) ➤

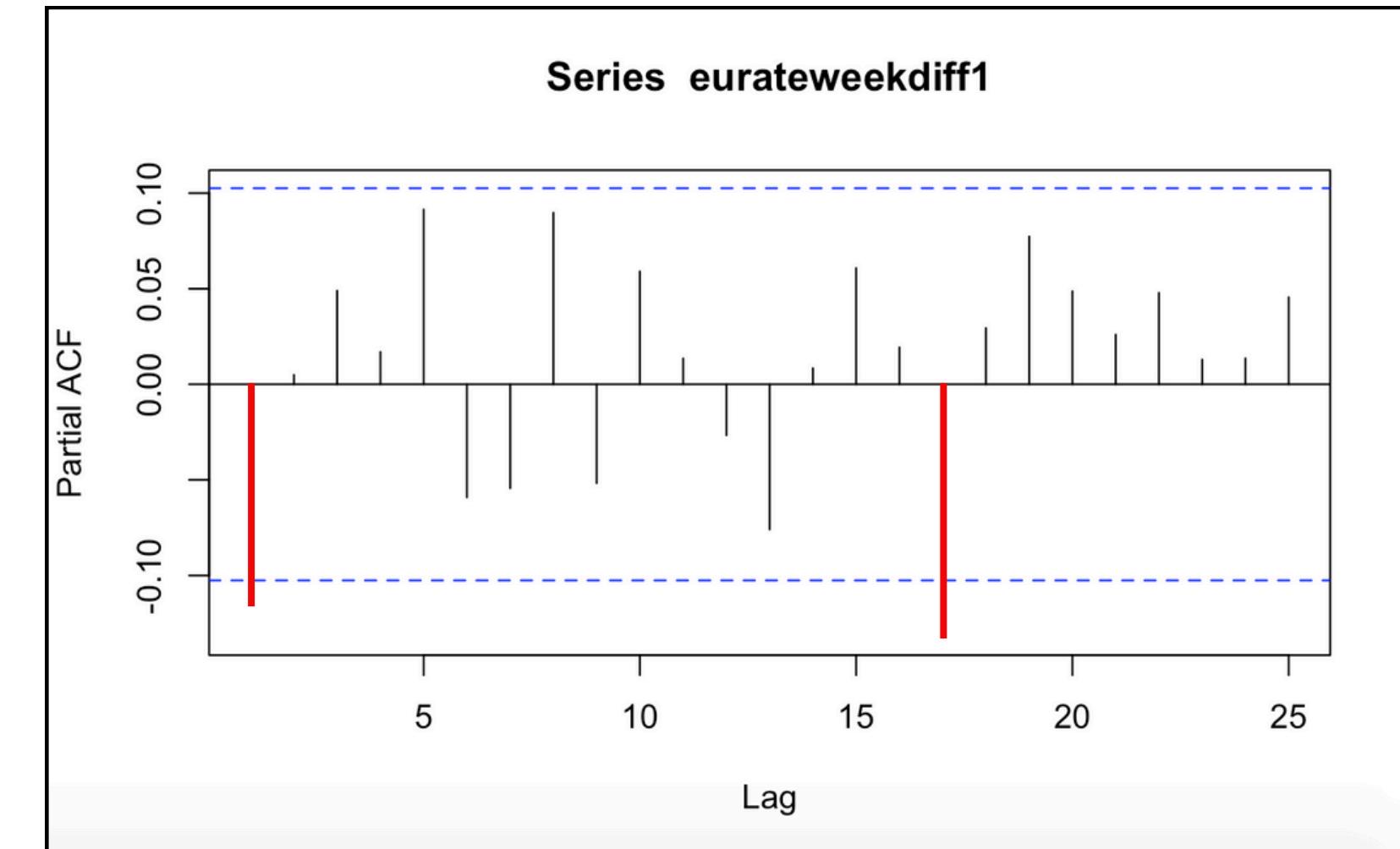
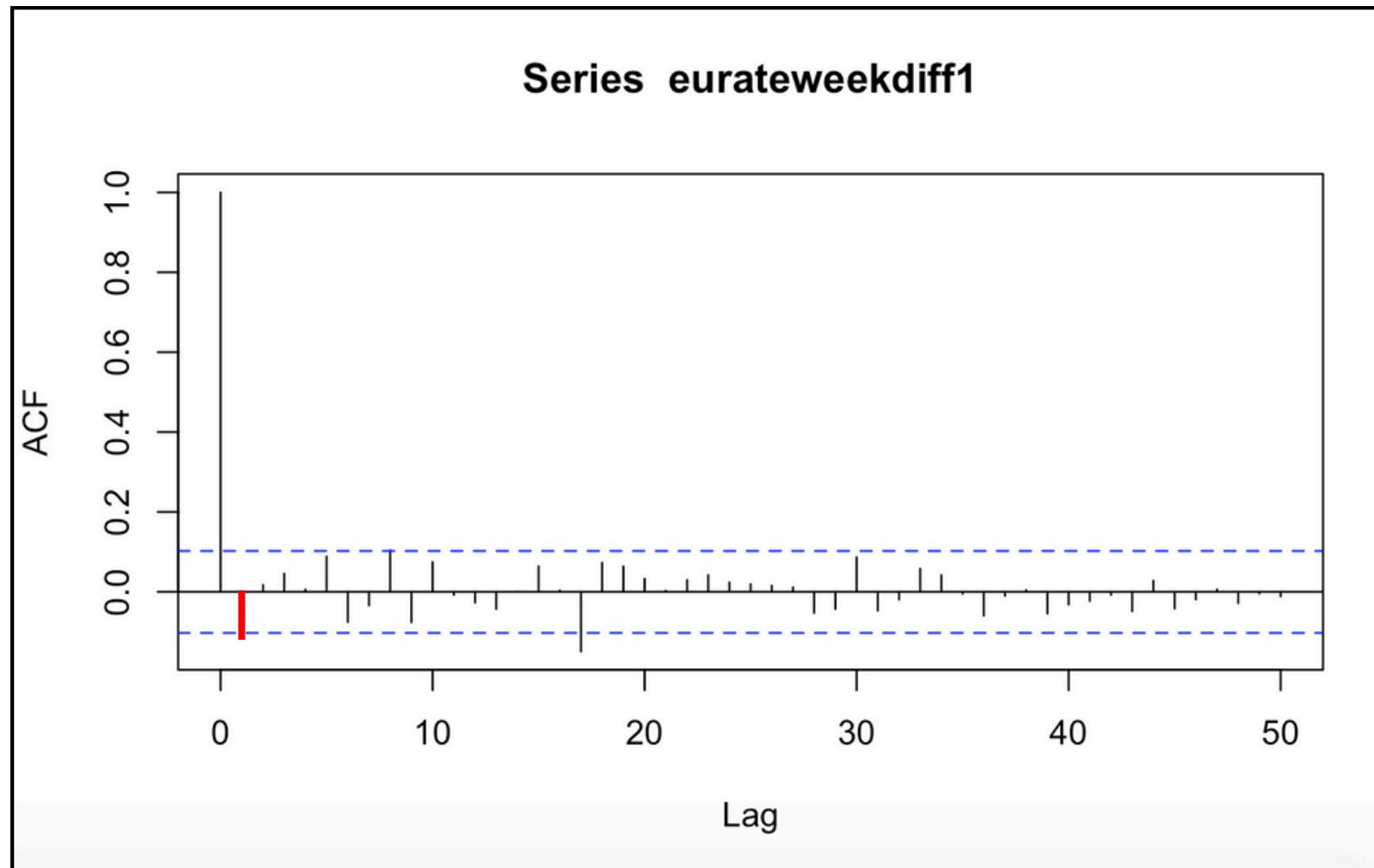


一階差分



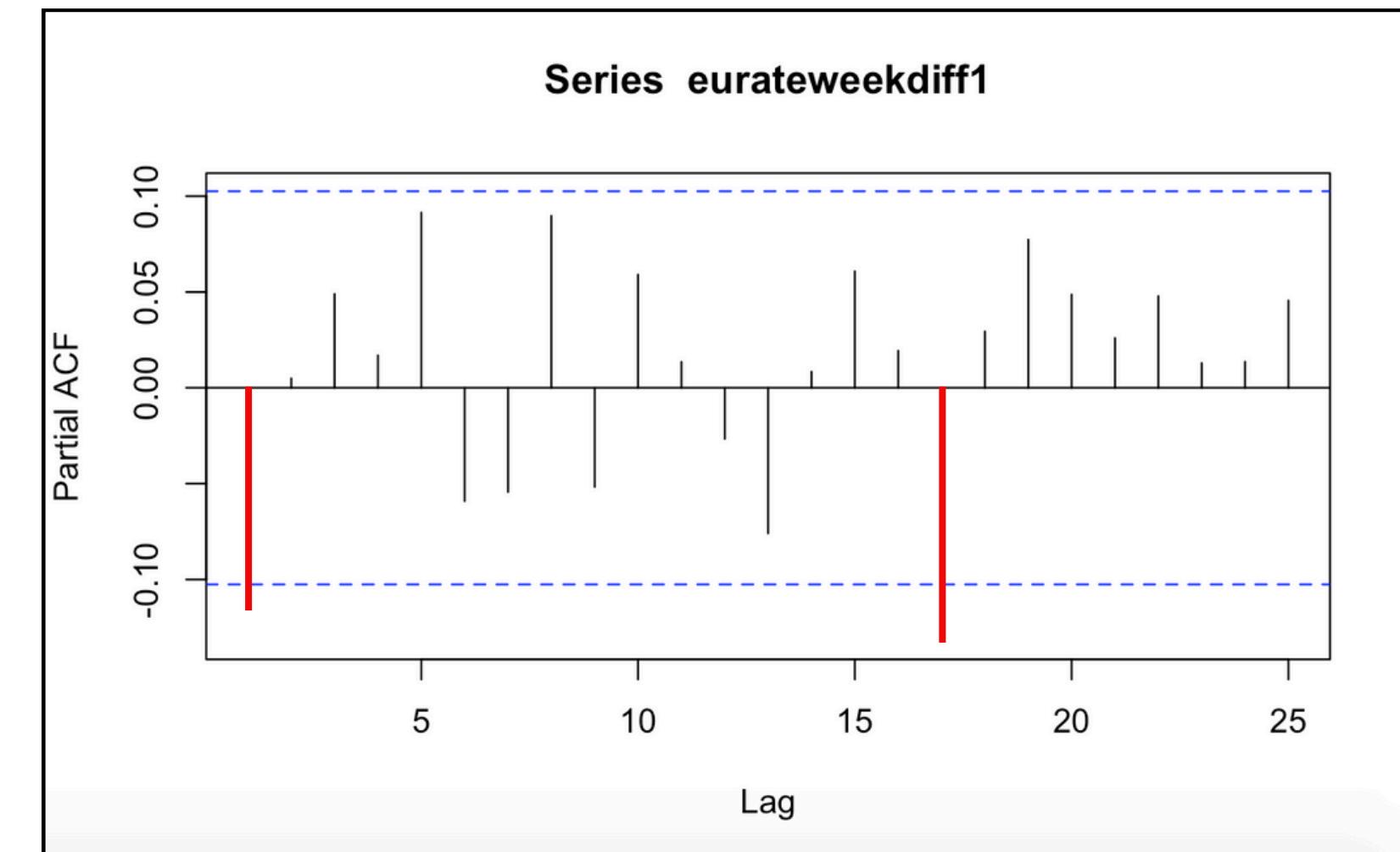
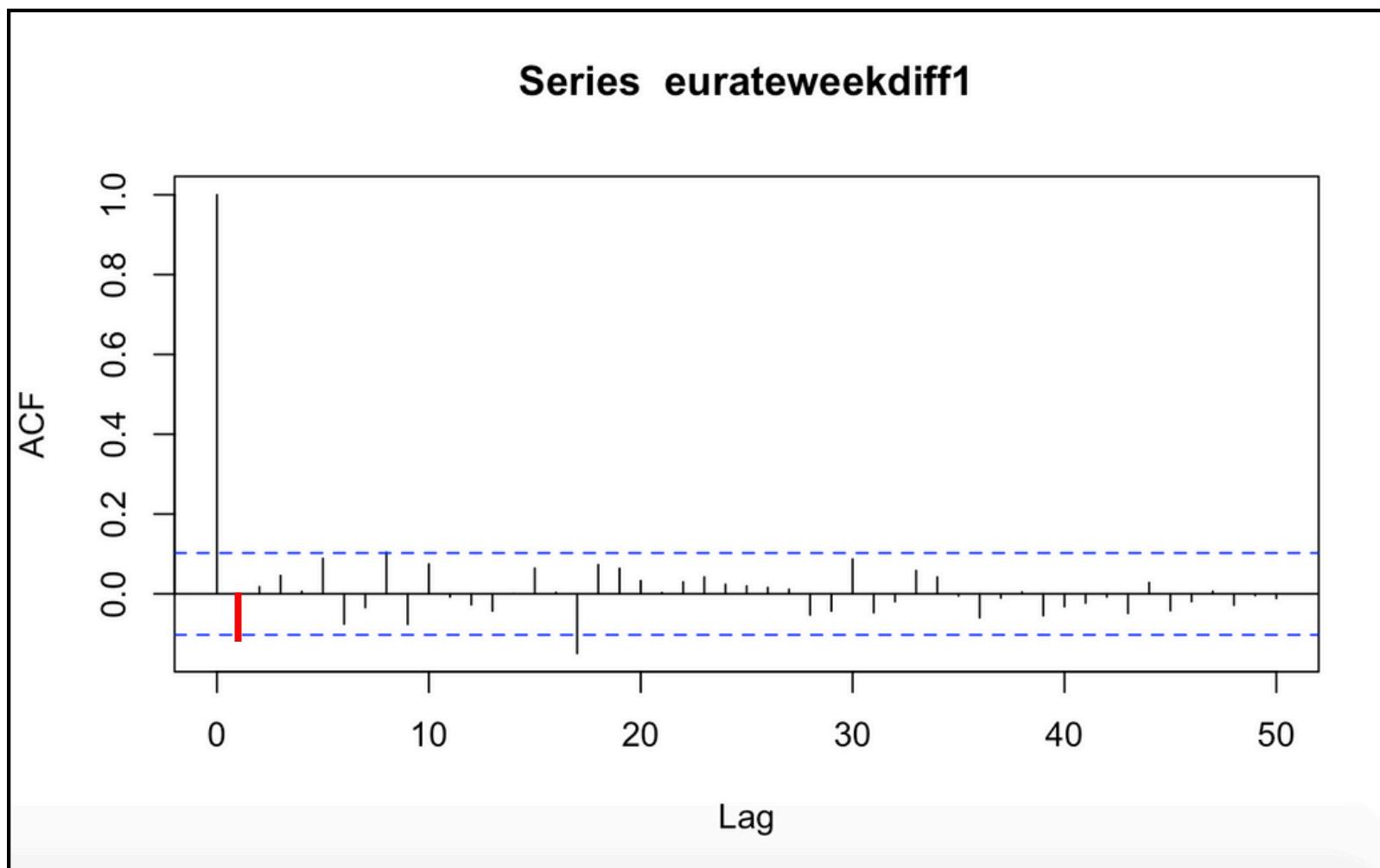
- ACF 下降緩慢，因此進行一階差分。

一階差分



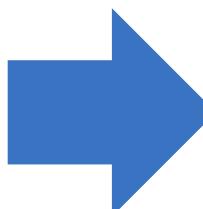
上述兩圖表為進行一階差分後的acf pacf 圖

模型配適



ACF 截斷在 $lag = 1$

PACF 截斷在 $lag=1$ 、 $lag = 17$



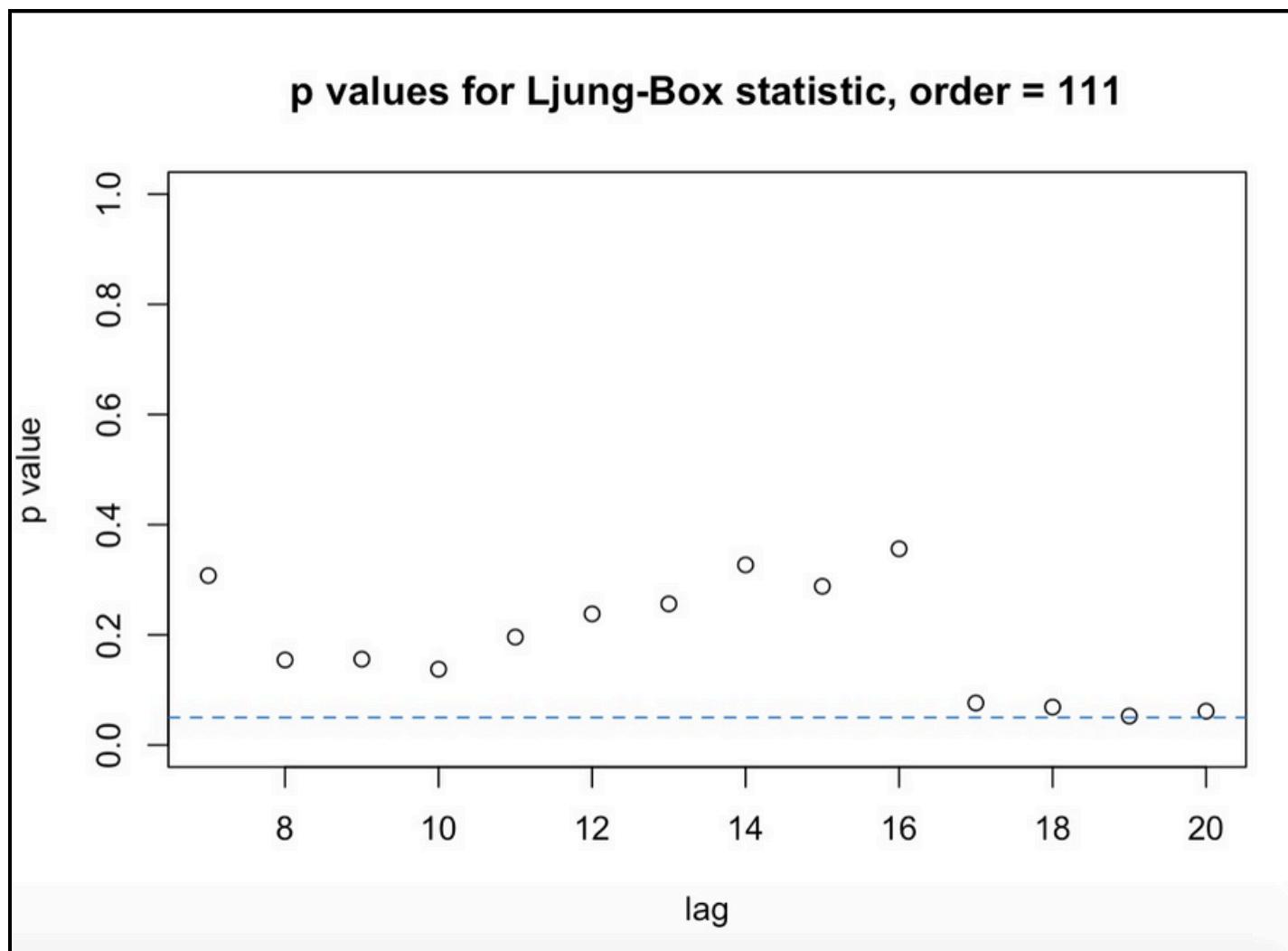
ARIMA(1,1,1)

ARIMA(17,1,1)

AR(1)

MA(1)

ARIMA (1,1,1)



Coefficients:

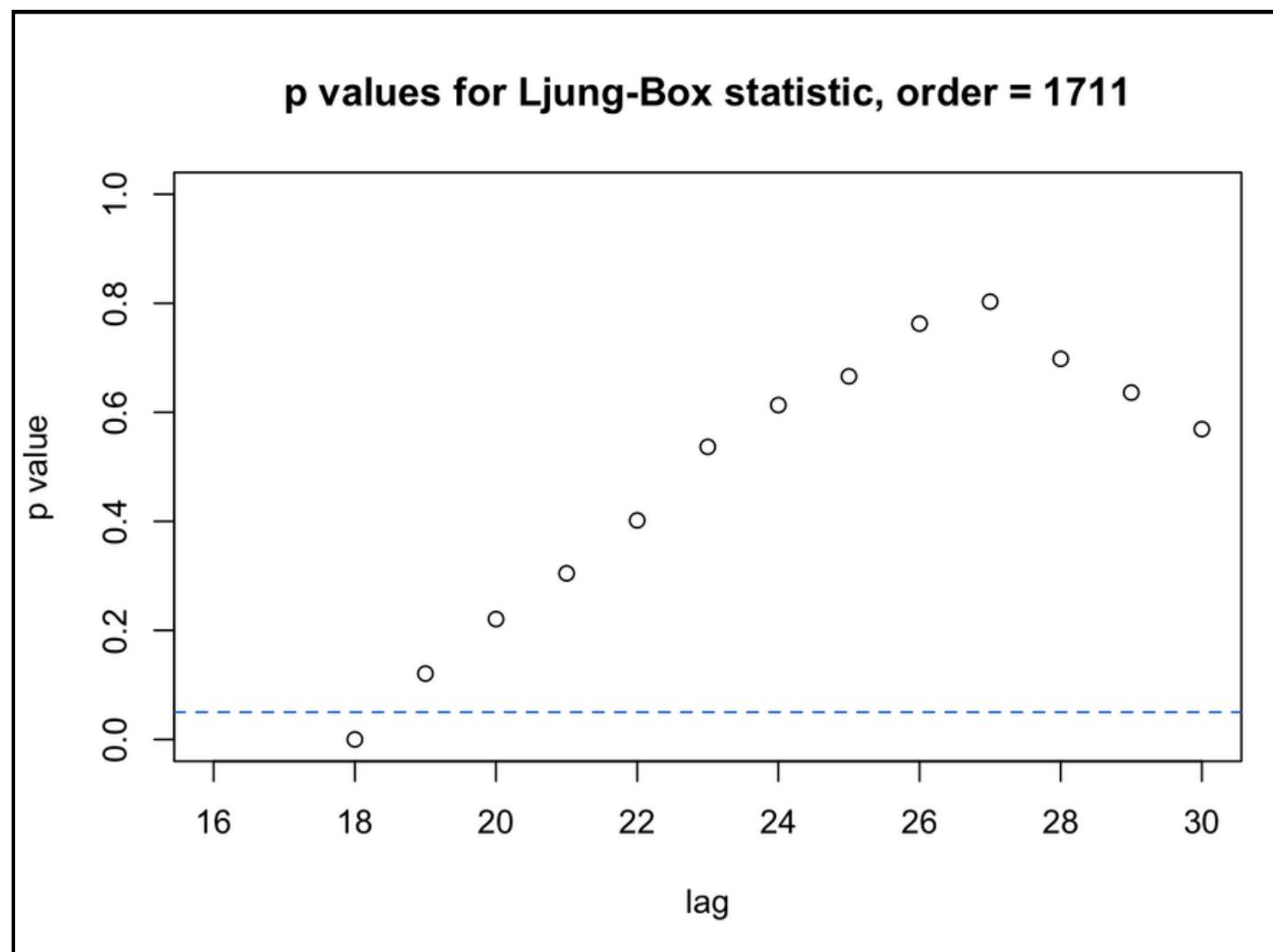
ar1	ma1
-0.1391	0.0254
s.e.	0.3382
	0.3393

► $(1 + 0.1391B)\nabla X_t = (1 + 0.0254)Z_t$

sigma^2 estimated as 0.000117:

log likelihood = 1134.25, aic = -2264.49

ARIMA (17,1,1)



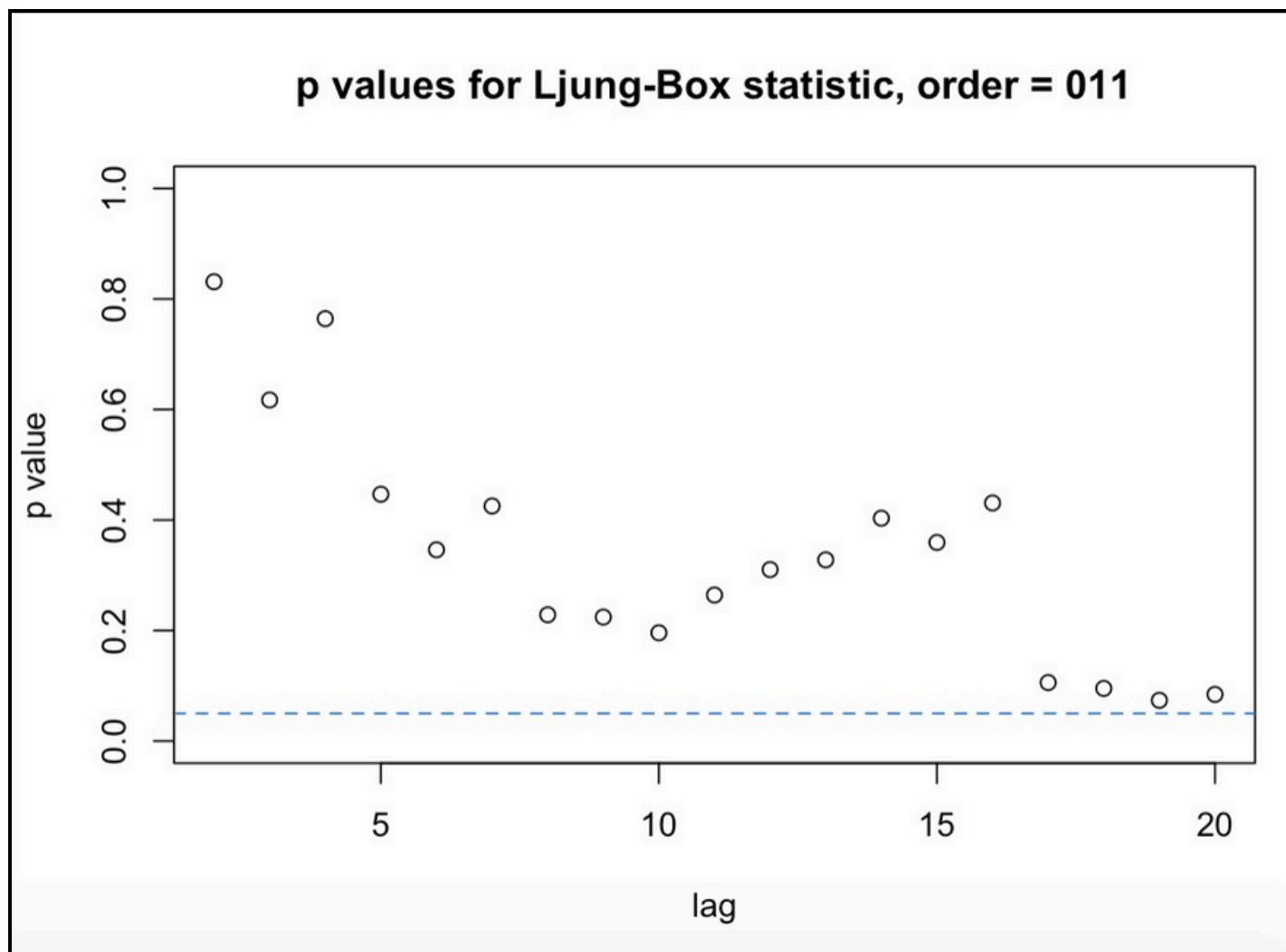
Coefficients:

	ar1	ar2	ar3	ar4	ar5	ar6	ar7	ar8
ar9	-0.2180	0.0163	0.0558	0.0317	0.0772	-0.0602	-0.0562	
ar10	0.0812	-0.0158	0.0508	0.0042				
s.e.	0.2805	0.0607	0.0535	0.0555	0.0542	0.0577	0.0570	
0.0557	0.0597	0.0547	0.0569					
ar12		ar13	ar14	ar15	ar16	ar17	ma1	
	-0.0235	-0.0799	0.0162	0.0650	0.0139	-0.1327	0.1184	
s.e.	0.0539	0.0546	0.0581	0.0539	0.0567	0.0535	0.2808	

sigma^2 estimated as 0.0001098:

log likelihood = 1145.49, aic = -2254.97

ARIMA (0,1,1)



Coefficients:

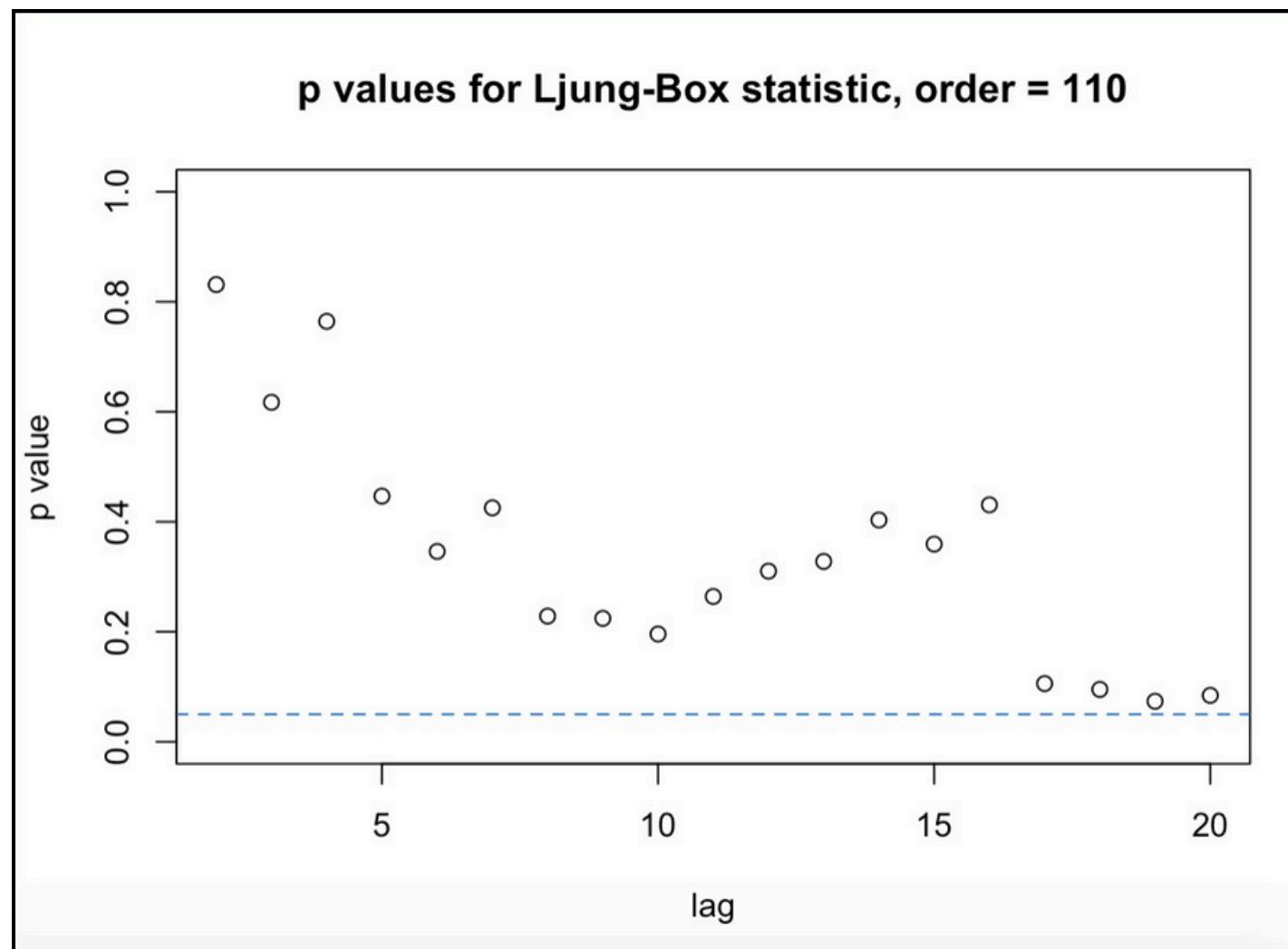
ma1
-0.1094
s.e. 0.0503

► $\nabla X_t = (1 - 0.1094)Z_t$

sigma^2 estimated as 0.0001171:

log likelihood = 1134.16, aic = -2266.33

ARIMA (1,1,0)



Coefficients:

ar1
-0.1138
s.e. 0.0520

► $(1 + 0.1138B)\nabla X = Zt$

sigma^2 estimated as 0.000117:
log likelihood = 1134.24, aic = -2266.49

model	AIC	BIC
arima(1, 1, 1)	-2264.49	-2250.792
arima(17, 1, 1)	-2254.97	-2178.875
arima(1, 1, 0)	-2266.49	-2256.686
arima(0, 1, 1)	-2266.33	-2256.527

ARIMA(1, 1 ,0)係數檢定

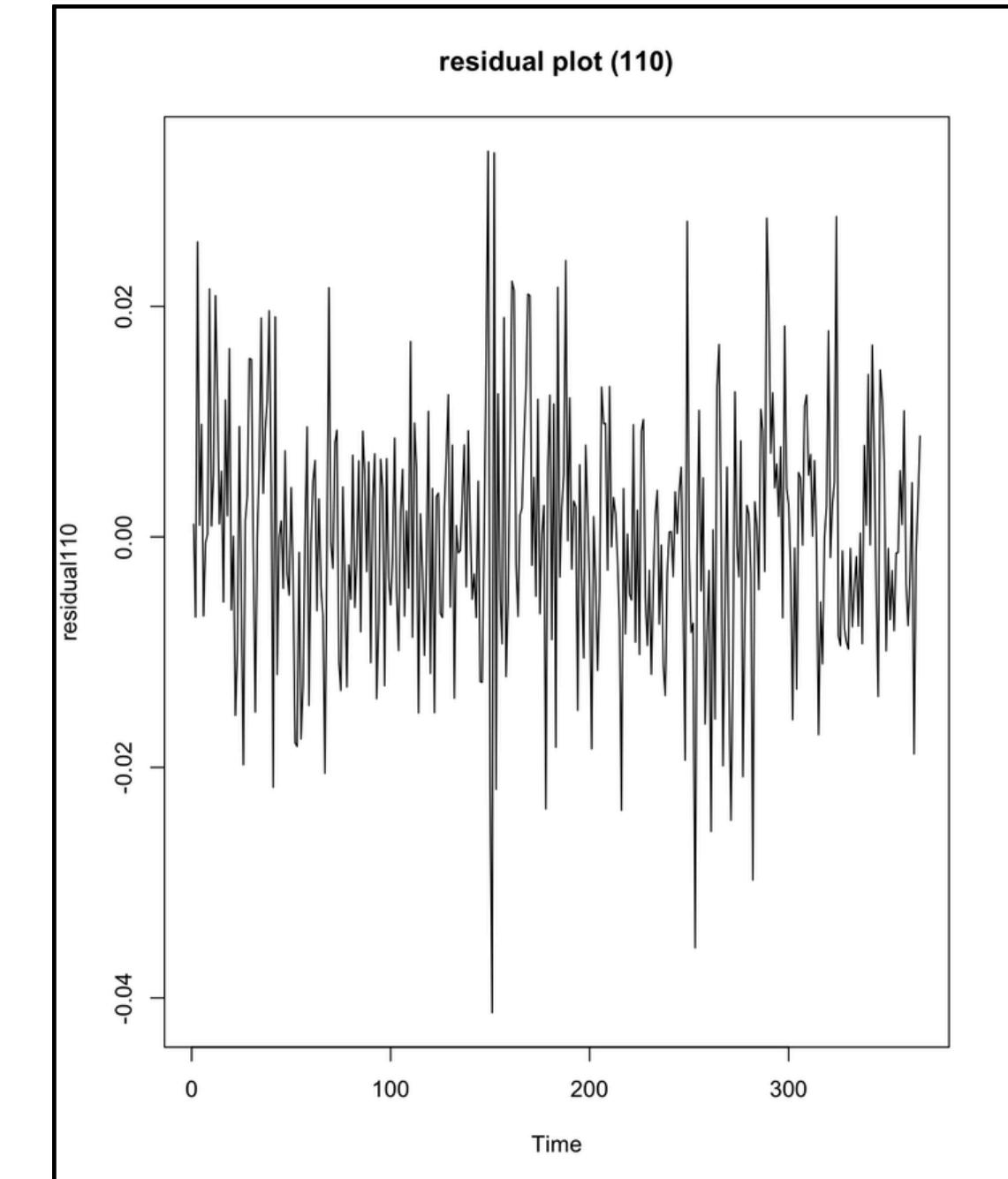
$$(1 + 0.1138B)\nabla X = Zt$$

係數t檢定：

H0 : 係數對模型沒有顯著影響

H1 : 係數對模型有顯著影響

	Coefficients	StdError	t_value	p_value
ar1	-0.113838	0.05200598	-2.188941	0.02860112

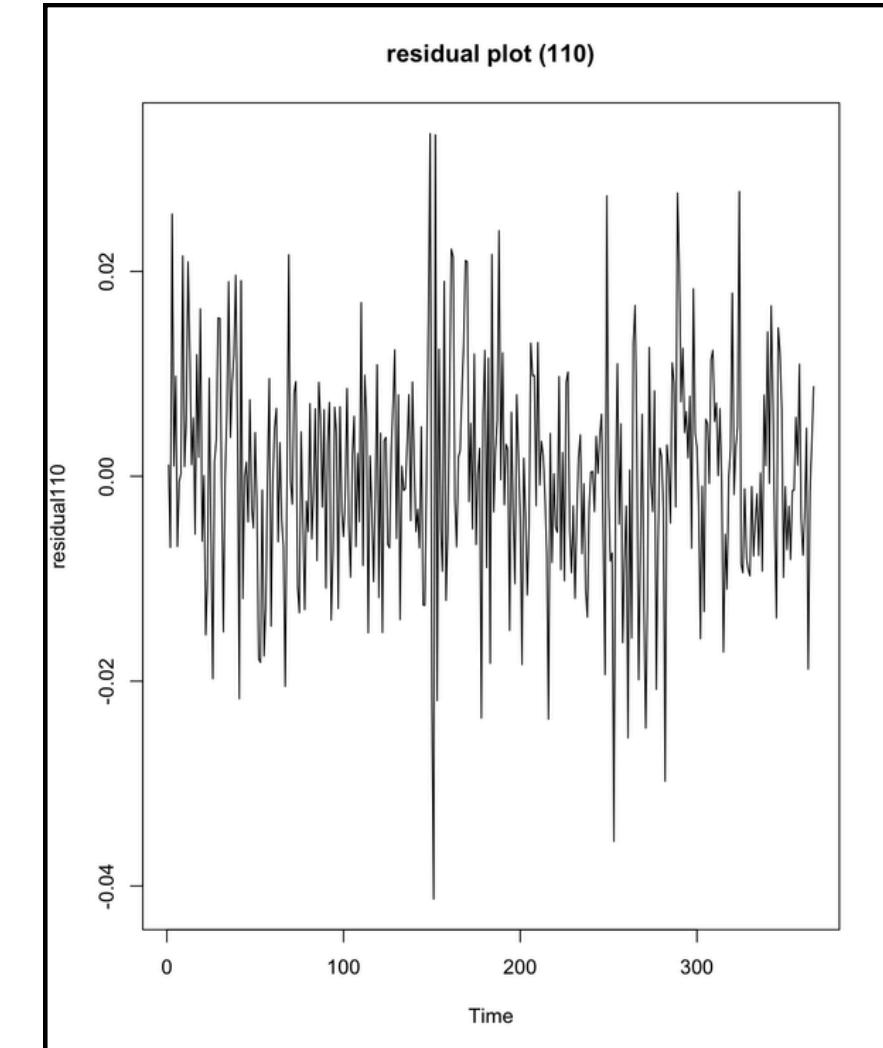
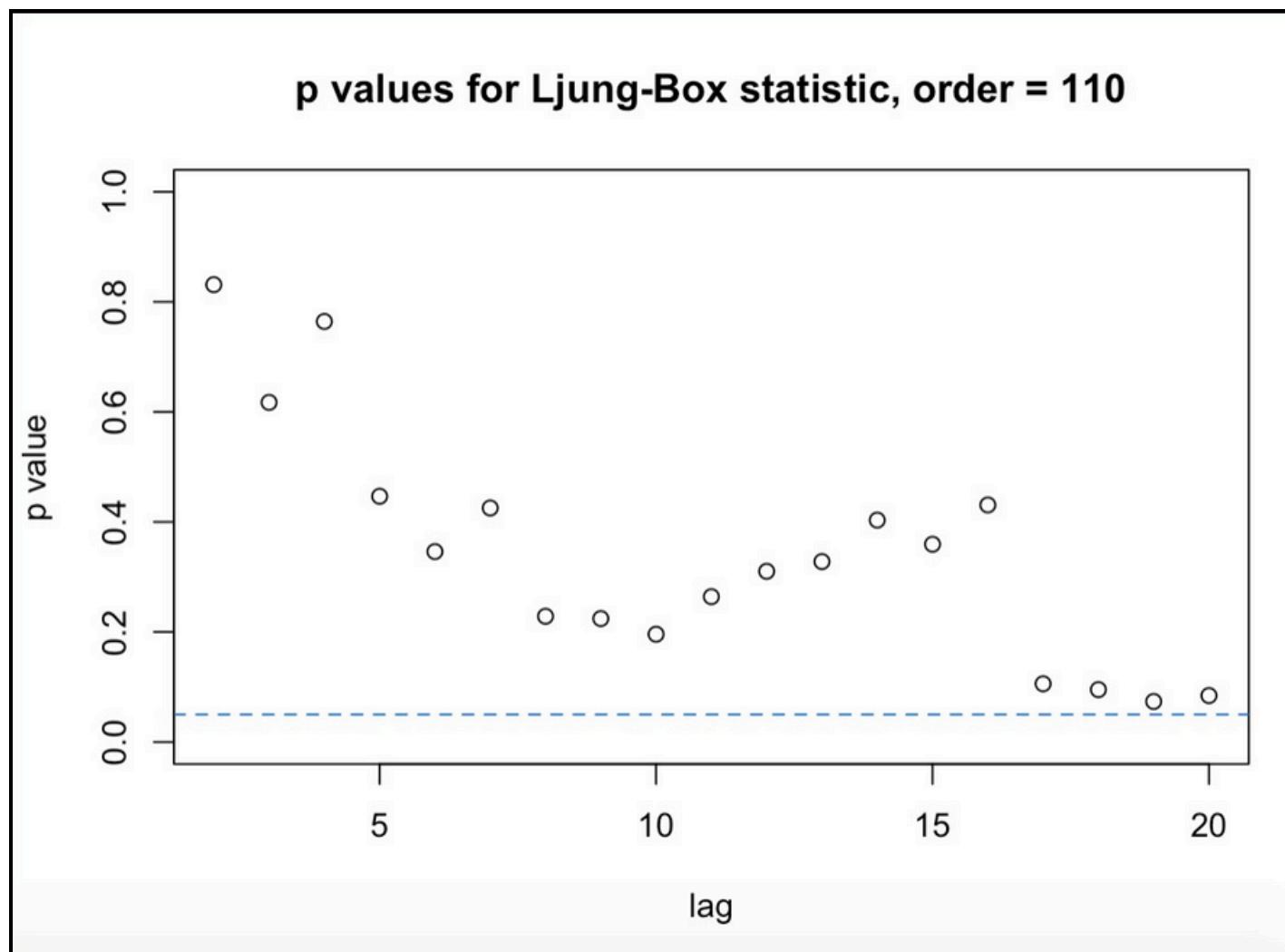


p-value = 0.02860



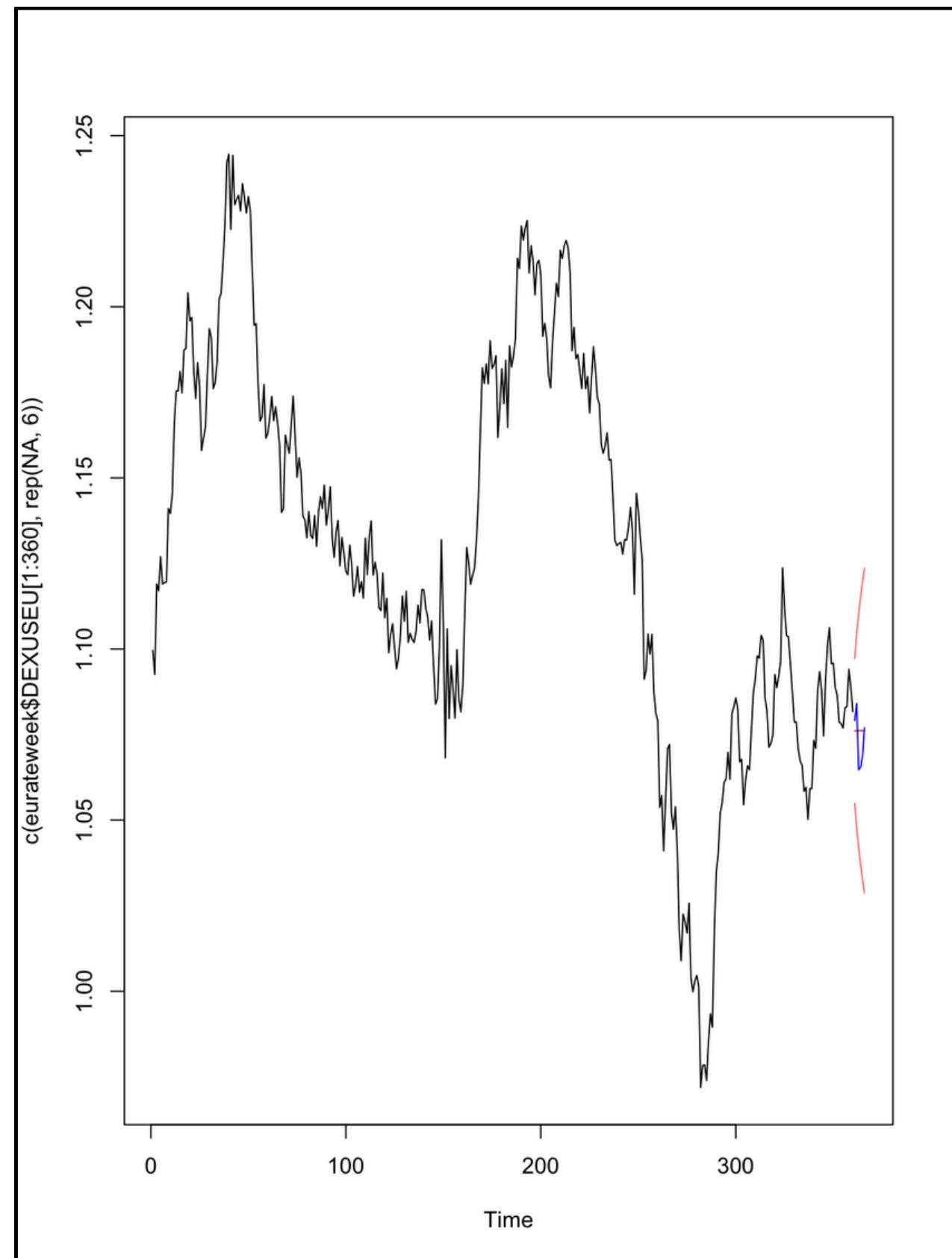
拒絕虛無假設，係數對模型有顯著影響

模型選擇：ARIMA(1, 1 ,0)



**sigma^2 estimated as 0.000117:
log likelihood = 1134.24, aic = -2266.49**

$$(1 + 0.1138B)\nabla X = Zt$$



THANK YOU

