7.17

a.

Dependent Variable: LOG(Y)
Method: Least Squares
Date: 12/02/20 Time: 15:14
Sample: 1960 1982
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.432539	0.161811	15.03316	0.0000
LOG(X2)	0.346465	0.071798	4.825530	0.0002
LOG(X3)	-0.588074	0.100524	-5.850108	0.0000
LOG(X4)	0.365333	0.117870	3.099451	0.0065
LOG(X5)	0.340339	0.127057	2.678642	0.0159
LOG(X6)	-0.453193	0.168669	-2.686874	0.0156

R-squared	0.987585	Mean dependent var	3.663887
Adjusted R-squared	0.983934	S.D. dependent var	0.187659
S.E. of regression	0.023786	Akaike info criterion	-4.419967
Sum squared resid	0.009618	Schwarz criterion	-4.123751
Log likelihood	56.82962	Hannan-Quinn criter.	-4.345469
F-statistic	270.4698	Durbin-Watson stat	2.173348
Prob(F-statistic)	0.000000		

$$\widehat{Y_\iota} = -16.3978 + 12.9117lnX_2 - 18.2147lnX_3 + 11.0323lnX_4 + 18.6245lnX_5 - 21.3990lnX_6$$

b.

Dependent Variable: Y
Method: Least Squares
Date: 12/02/20 Time: 14:53
Sample: 1960 1982
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	38.59691	4.214488	9.158150	0.0000
X2	0.004889	0.004962	0.985370	0.3383
X3	-0.651888	0.174400	-3.737889	0.0016
X4	0.243242	0.089544	2.716443	0.0147
X5	0.104318	0.070644	1.476674	0.1580
X6	-0.071110	0.098381	-0.722805	0.4796

R-squared	0.944292	Mean dependent var	39.66957
Adjusted R-squared	0.927908	S.D. dependent var	7.372950
S.E. of regression	1.979635	Akaike info criterion	4.423160
Sum squared resid	66.62224	Schwarz criterion	4.719376
Log likelihood	-44.86635	Hannan-Quinn criter.	4.497658
F-statistic	57.63303	Durbin-Watson stat	1.100559
Prob(F-statistic)	0.000000		

$$\widehat{Y_\iota} = 38.5969 + 0.0049X_2 - 0.6519X_3 + 0.2432X_4 + 0.1043X_5 - 0.0711X_6$$

c.

使用 MWD 检验

Dependent Variable: Y
Method: Least Squares
Date: 12/02/20 Time: 15:18
Sample: 1960 1982
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.853942	5.753173	-1.538967	0.1434
X2	-0.003242	0.002334	-1.389318	0.1838
X3	0.237488	0.126952	1.870694	0.0798
X4	-0.085829	0.054056	-1.587777	0.1319
X5	-0.011956	0.033250	-0.359569	0.7239
X6	0.026166	0.043846	0.596784	0.5590
Z1	-1.302963	0.149900	-8.692188	0.0000

R-squared	0.990265	Mean dependent var	39.66957
Adjusted R-squared	0.986614	S.D. dependent var	7.372950
S.E. of regression	0.853042	Akaike info criterion	2.765775
Sum squared resid	11.64290	Schwarz criterion	3.111360
Log likelihood	-24.80642	Hannan-Quinn criter.	2.852689
F-statistic	271.2464	Durbin-Watson stat	2.424132
Prob(F-statistic)	0.000000		

Dependent Variable: LOG(Y)
Method: Least Squares
Date: 12/02/20 Time: 15:19
Sample: 1960 1982
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.410105	0.162966	14.78896	0.0000
LOG(X2)	0.348173	0.071683	4.857118	0.0002
LOG(X3)	-0.587909	0.100335	-5.859436	0.0000
LOG(X4)	0.377736	0.118262	3.194047	0.0056
LOG(X5)	0.361278	0.128433	2.812966	0.0125
LOG(X6)	-0.484122	0.171003	-2.831071	0.0120
Z2	-1.00E-25	9.73E-26	-1.031433	0.3177

R-squared	0.988359	Mean dependent var	3.663887
Adjusted R-squared	0.983994	S.D. dependent var	0.187659
S.E. of regression	0.023742	Akaike info criterion	-4.397384
Sum squared resid	0.009019	Schwarz criterion	-4.051799
Log likelihood	57.56991	Hannan-Quinn criter.	-4.310470
F-statistic	226.4154	Durbin-Watson stat	2.150399
Prob(F-statistic)	0.000000		

从回归结果中可以看出，做 Y 对X_i和Z_1的回归，根据 t 检验Z_1的系数是统计显著的，拒绝原假设，则认为 Y 不是 X 的线性函数。

做 lnY 对 lnX_i和Z_2的回归，Z_2的系数在 0.05 置信水平下不是统计显著的，不能拒绝H_1，则认为 lnY 是 lnX 的线性函数.所以选择线性对数模型。