Session 3 - Workshop

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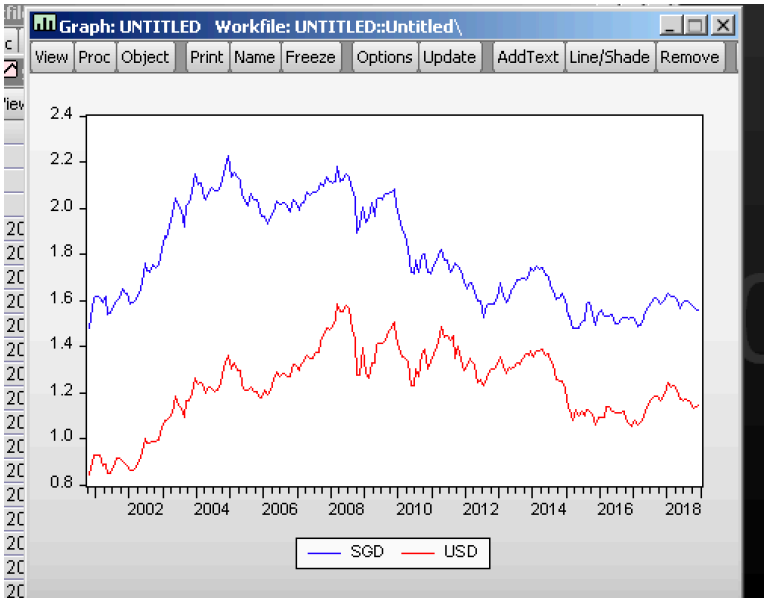
1b)



1c)

Result show that model with differenced variables is better. DW statistics show that the original model (with value 0.0143) has autocorrelation, while the second model (with value 2.124) the autocorrelation is fixed and with a larger R square value. The original value can't reject the assumption that γ =0. This can also be observed from the correlogram below.

Estimation output :

SGD

Dependent Variable: SGD
Method: Least Squares

Sample: 2000M10 2018M12
Included observations: 219

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.896335	0.093412	9.595450	0.0000
USD	0.729649	0.075465	9.668711	0.0000

R-squared	0.301091	Mean dependent var	1.791516
Adjusted R-squared	0.297870	S.D. dependent var	0.219051
S.E. of regression	0.183550	Akaike info criterion	-0.543571
Sum squared resid	7.310848	Schwarz criterion	-0.512620
Log likelihood	61.52098	Hannan-Quinn criter.	-0.531071
F-statistic	93.48398	Durbin-Watson stat	0.014297
Prob(F-statistic)	0.000000		

D(SGD)

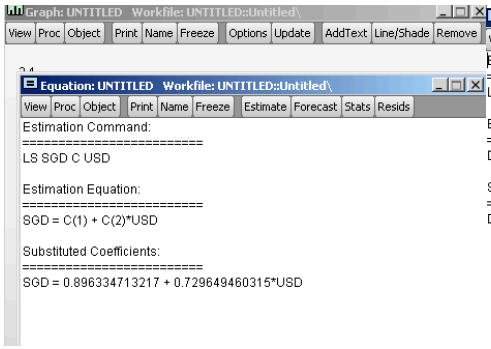
Dependent Variable: D(SGD)
Method: Least Squares
Date: 01/30/19 Time: 20:09
Sample (adjusted): 2000M11 2018M12
Included observations: 218 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000835	0.001453	-0.574769	0.5660
D(USD)	0.865191	0.040209	21.51710	0.0000

R-squared	0.681878	Mean dependent var	0.000369
Adjusted R-squared	0.680406	S.D. dependent var	0.037910
S.E. of regression	0.021432	Akaike info criterion	-4.838757
Sum squared resid	0.099213	Schwarz criterion	-4.807707
Log likelihood	529.4245	Hannan-Quinn criter.	-4.826215
F-statistic	462.9856	Durbin-Watson stat	2.124222
Prob(F-statistic)	0.000000		

Representations:

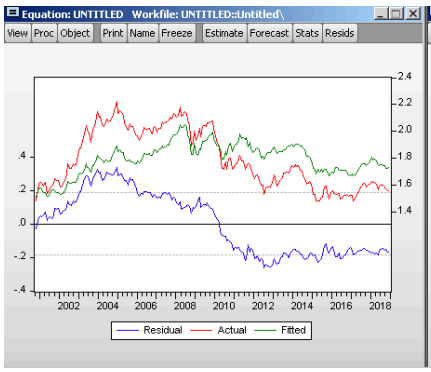
SGD



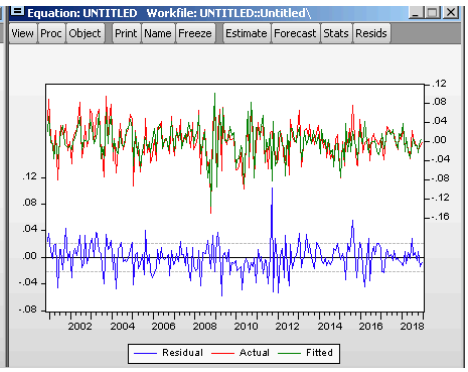
D(SGD)

Residuals:

SGD

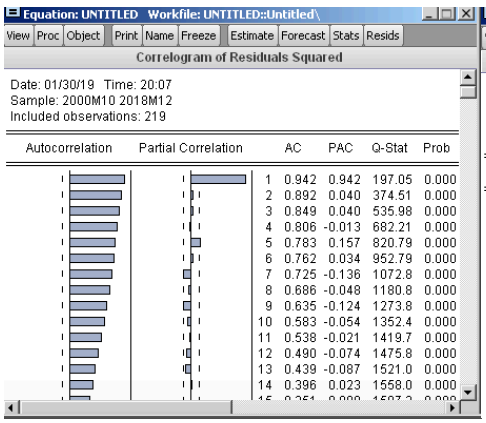


D(SGD)

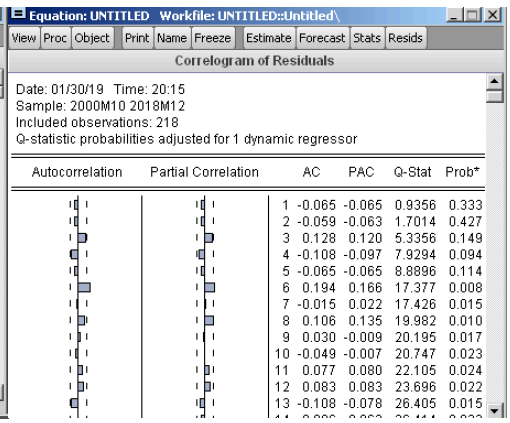


Correlogram

SGD

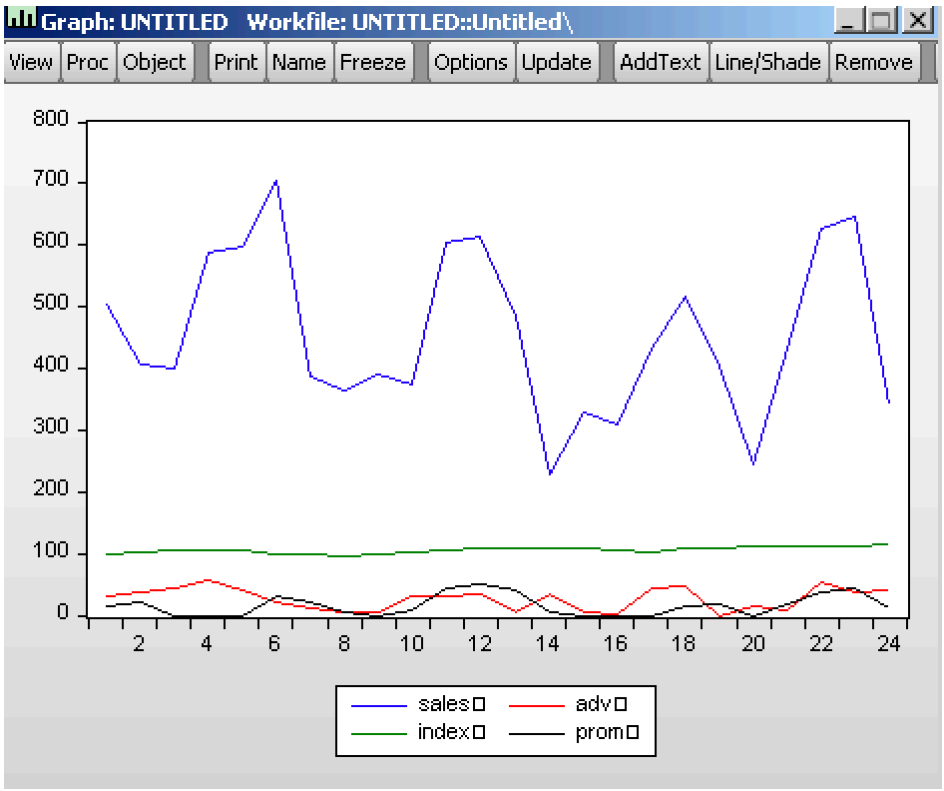


D(SGD)

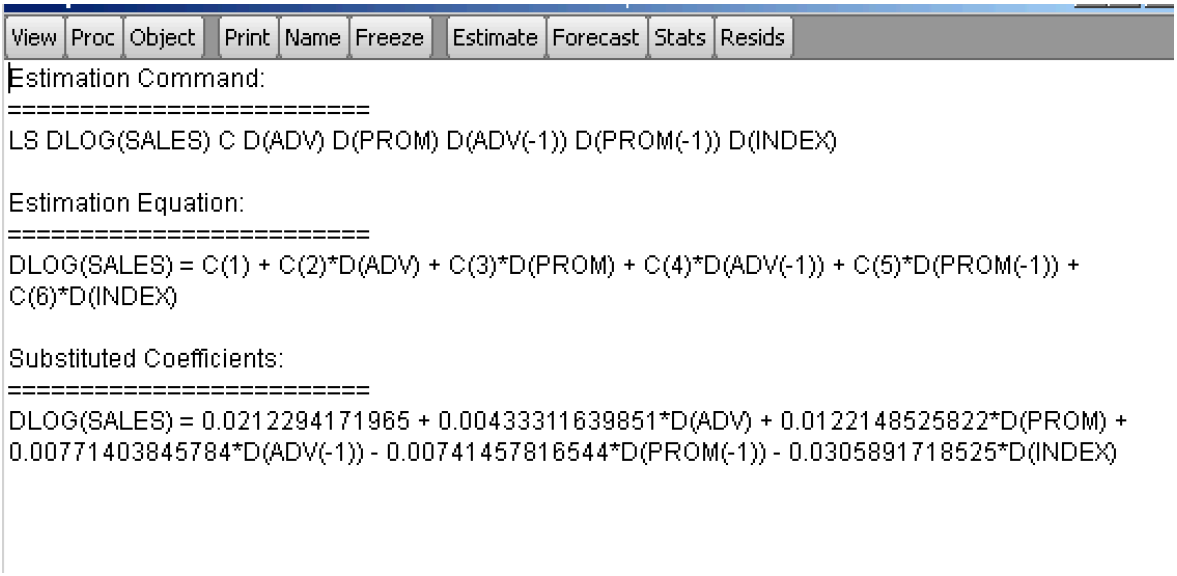


2.

Graph:



Model as follow:



Estimation output : DW = 1.838714, autocorrelation is fixed

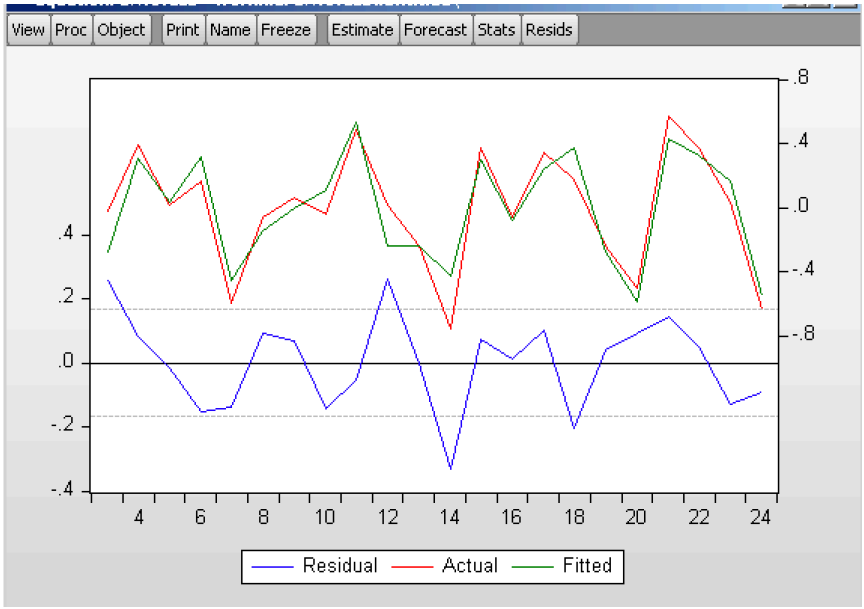
View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: DLOG(SALES)
Method: Least Squares
Date: 01/30/19 Time: 20:47
Sample (adjusted): 3 24
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.021229	0.036785	0.577124	0.5719
D(ADV)	0.004333	0.001733	2.499905	0.0237
D(PROM)	0.012215	0.002296	5.320346	0.0001
D(ADV(-1))	0.007714	0.002177	3.543632	0.0027
D(PROM(-1))	-0.007415	0.002177	-3.406474	0.0036
D(INDEX)	-0.030589	0.018263	-1.674970	0.1134

R-squared	0.845132	Mean dependent var	-0.007756
Adjusted R-squared	0.796736	S.D. dependent var	0.368993
S.E. of regression	0.166360	Akaike info criterion	-0.522327
Sum squared resid	0.442809	Schwarz criterion	-0.224770
Log likelihood	11.74560	Hannan-Quinn criter.	-0.452232
F-statistic	17.46276	Durbin-Watson stat	1.838714
Prob(F-statistic)	0.000006		

Residuals:

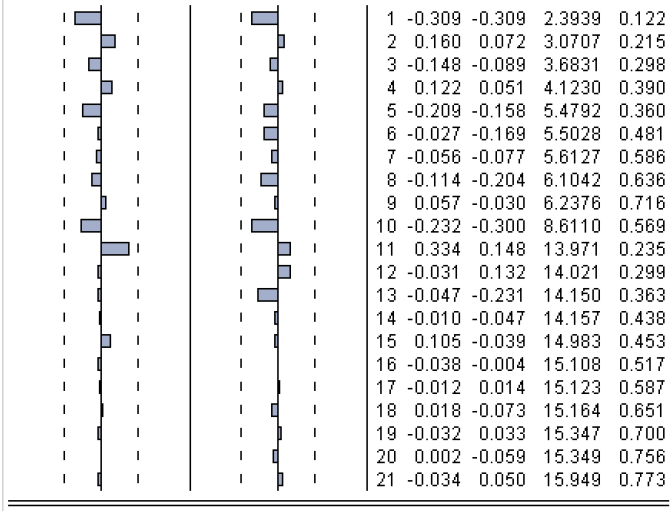


Correlogram

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Correlogram of Residuals Squared

Date: 01/30/19 Time: 20:50
Sample: 1 24
Included observations: 22



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.309	-0.309	2.3939	0.122
		2	0.160	0.072	3.0707	0.215
		3	-0.148	-0.089	3.6831	0.298
		4	0.122	0.051	4.1230	0.390
		5	-0.209	-0.158	5.4792	0.360
		6	-0.027	-0.169	5.5028	0.481
		7	-0.056	-0.077	5.6127	0.586
		8	-0.114	-0.204	6.1042	0.636
		9	0.057	-0.030	6.2376	0.716
		10	-0.232	-0.300	8.6110	0.569
		11	0.334	0.148	13.971	0.235
		12	-0.031	0.132	14.021	0.299
		13	-0.047	-0.231	14.150	0.363
		14	-0.010	-0.047	14.157	0.438
		15	0.105	-0.039	14.983	0.453
		16	-0.038	-0.004	15.108	0.517
		17	-0.012	0.014	15.123	0.587
		18	0.018	-0.073	15.164	0.651
		19	-0.032	0.033	15.347	0.700
		20	0.002	-0.059	15.349	0.756
		21	-0.034	0.050	15.949	0.773

Q1:

The coefficient of D(prom) is 0.0122 and the coefficient of D(adv) is 0.0043. This means that $ 1K promotion expenditure will increase the sales by 0.0122% whereas $ 1K advertisement expenditure will only increase the sales by 0.0043%. The $1K should be spend on promotion if Franklin is focusing on current quarter sale.

However, the coefficient of D(prom(-1)) is -0.0074 and the coefficient of D(adv(-1)) is 0.0077. This means that $ 1K promotion expenditure will decrease the next sales by 0.0074% whereas $ 1K advertisement expenditure will increase the next sales by 0.0077%.

Q2: Yes agree. Because the coefficient of index is negative means , the better the economic, the less the sales. However, this effect is not significant

Q3: This policy has not been follows. Some quarters there are both promotion and advertisement expense. For examples, quarter 1 ,2

Q4:

From the original data graph there's seasonal effects . Summer times sales is higher. However, the Correlogram shows that the effect is not significant .