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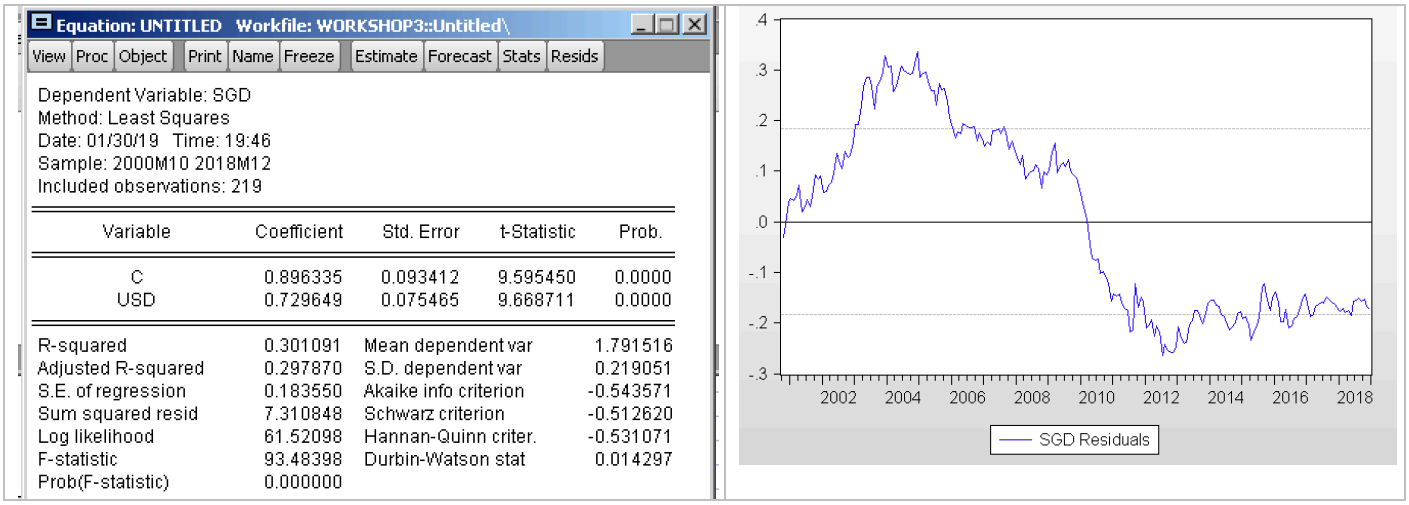
QRM – Workshop 3

Question 1:

Overall, does the model look reasonable? Are the residuals OK? If you want to estimate a slightly different model, select Estimate from the menu bar of the current Equation window. Note that in EViews the differencing operator is D( ). For example, D(USD) is a new variable which equals the changes in USD. What can you conclude from the relation between the Euro, the SGD and the USD?

Initial regression run:



Equation: UNTITLED Workfile: WORKSHOP3::Untitled\

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

Dependent Variable: SGD
Method: Least Squares
Date: 01/30/19 Time: 19:46
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		

Running the regression, the model is not good as the Durbin-Watson stat is lower than 1.5, which means there is autocorrelation.

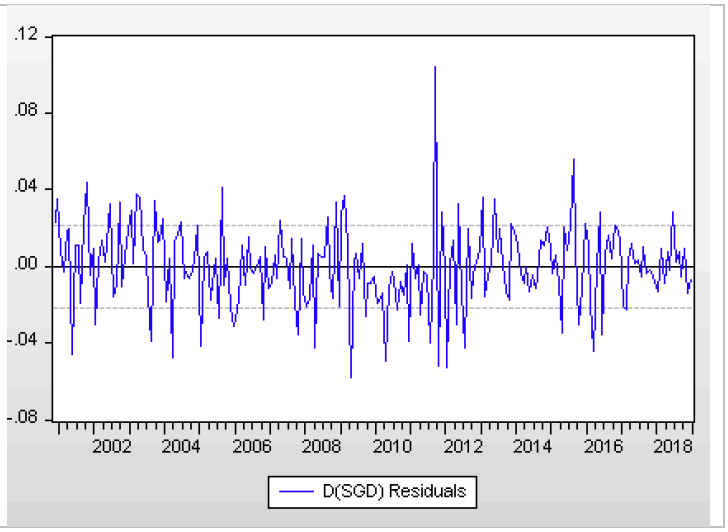
From this residual graph, there is an obvious downward trend. The objective of the next model will remove the autocorrelation and obtain a stationary series.

Model 2: DLog(SGD)

Dependent Variable: D(SGD)
Method: Least Squares
Date: 01/30/19 Time: 19:54
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		



The Durbin-Watson stat is now within the acceptable range of 1.5 to 2.5, and the residual graph now have a stable means and variance over time.

For every 1% increase in USD exchange rate to Euro, the model suggests that there is a 0.86% increase in SGD exchange rate to Euro.

Question 2:

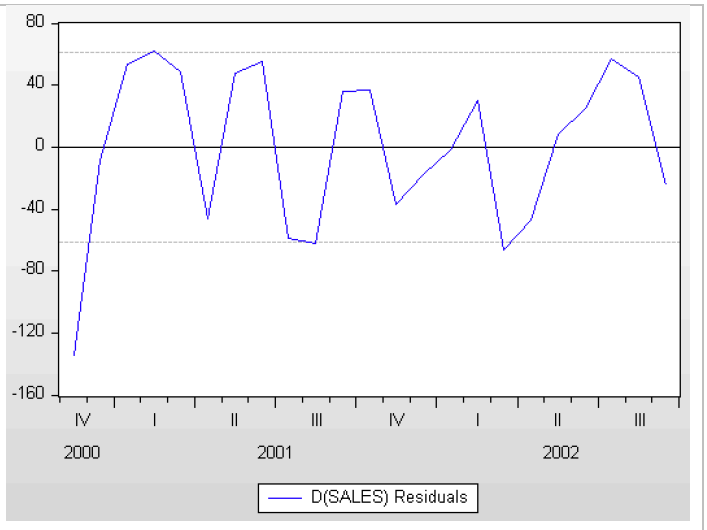
1. *If Ms. Franklin had one thousand dollars to spend on either advertising or promotion, which should she choose, and why? What is the effect of one thousand dollars spent on each?*

Answer:

Dependent Variable: D(SALES)
Method: Least Squares
Date: 01/30/19 Time: 20:40
Sample (adjusted): 2000M11 2002M09
Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	682.5074	328.7609	2.075999	0.0544
SALES(-1)	-0.924807	0.170363	-5.428437	0.0001
D(PROM)	5.830250	0.916050	6.364553	0.0000
PROM(-1)	2.282665	1.377803	1.656742	0.1170
D(ADV)	2.259098	0.769328	2.936457	0.0097
ADV(-1)	4.653023	1.146666	4.057870	0.0009
INDEX	-3.987649	2.967733	-1.343669	0.1978

R-squared	0.885820	Mean dependent var	-7.039565
Adjusted R-squared	0.843002	S.D. dependent var	155.1597
S.E. of regression	61.47887	Akaike info criterion	11.32105
Sum squared resid	60474.42	Schwarz criterion	11.66664
Log likelihood	-123.1921	Hannan-Quinn criter.	11.40797
F-statistic	20.68821	Durbin-Watson stat	1.431192
Prob(F-statistic)	0.000001		



Date: 01/30/19 Time: 20:48
Sample: 2000M10 2018M12
Included observations: 23
Q-statistic probabilities adjusted for 6 dynamic regressors

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.130	0.130	0.4429	0.506
		2	-0.400	-0.425	4.8319	0.089
		3	-0.143	-0.016	5.4165	0.144
		4	0.098	-0.054	5.7065	0.222
		5	0.021	-0.070	5.7199	0.334
		6	-0.336	-0.387	9.5434	0.145
		7	-0.119	-0.053	10.053	0.186
		8	0.305	0.058	13.628	0.092
		9	0.143	-0.067	14.471	0.107
		10	-0.213	-0.175	16.472	0.087
		11	-0.119	-0.037	17.148	0.104
		12	0.011	-0.272	17.154	0.144

*Probabilities may not be valid for this equation specification.

Based on the above, the $1,000 should be spend on advertising since with every $1,000 dollar increase in advertising in this quarter, increases the sales of this quarter by ~$2,259 and the subsequent quarter by ~$4,653. Whereas for promotion, every $1,000 dollar increase in promotion, it only increases the sales by ~$5,830 in this quarter without lag effect.

2. *As described above, the economic analyst thought that the meat loaf mix was a "counter-cyclical" item. Would you agree?*

Answer:
No, the results suggest that for every increment of index by 1, the sales is lowered by ~$3,988. However, the t-statistics is not significant and the above statement is inconclusive.

3. *As described above, the sales vice-president stated that company policy was that the company should advertise or promote in a given quarter, but not both. Has this policy been followed for meat loaf mix for the past 24 quarters?*

Answer:
No, based on the provided data, for some of the quarters, there were both advertisement and promotions. For example, quarter 6 and 7 have both high level of promotion and advertising budget.

4. *Do you think there are significant seasonal effects associated with meat loaf mix sales? How do you know?*

Answer:

From the graphs above, there seems to be a cyclical pattern to sales, with each cycle having 4 obvious segments/quarters. The 1st quarter has low sales and the 2nd quarter exhibits increasing sales from the preceding quarter. The sales tend to peak in the 3rd quarter, before dipping again in the 4th quarter.