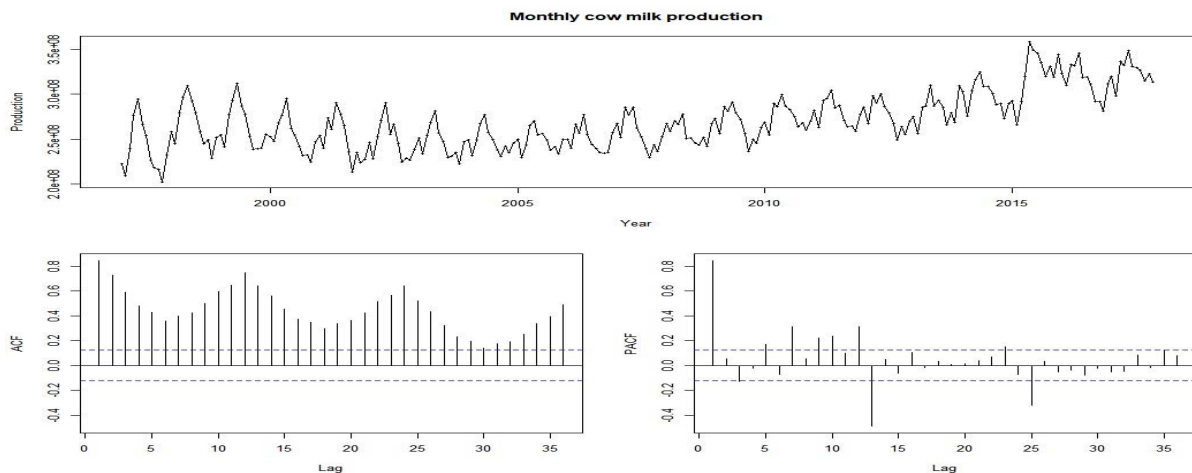


## FORECASTING ASSIGNMENT EXERCISE 4 (Milk Data)

Ravi Shankar

Data Set : Milk data shows the monthly quantity (in liters) of cow milk in Belgium received from dairy cow farmers (in Belgium + imported milk).

### VISUALIZATION



- Seasonal Data
- Trending data
- Non Stationary data

### MODEL ESTIMATION

#### ETS Model

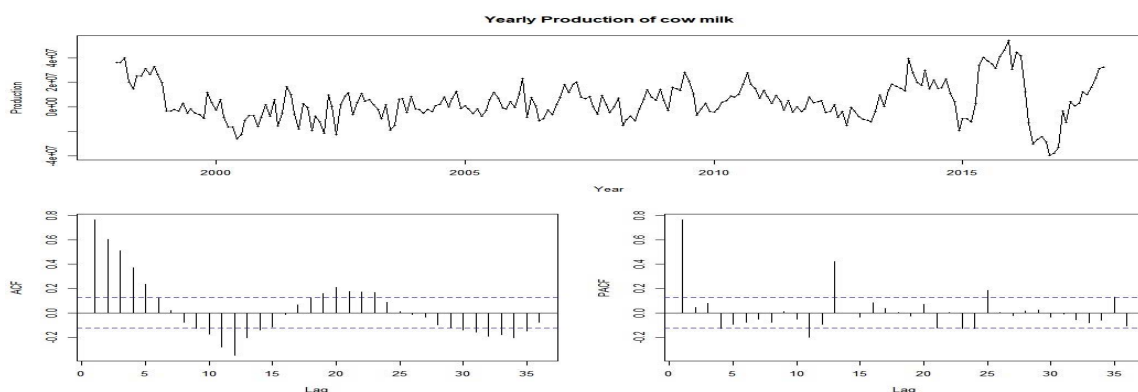
Model tried are ("AAA", "AAM", "AMA", "AMM", "AAA", "AAM", "AMA", "AMM"). with and without damping. All relevant models performance are compared together with other models in the end.

	AICc	MASE_train	MASE_test	RMSE_train	RMSE_test	Damping
AAA	8529.432	0.5705304	3.618906	8115367	40418109	0
AAM	8561.383	0.6161704	6.144042	8704379	69756189	0
AMA	8526.141	0.5669080	3.161628	8057004	35566082	0
AMM	8624.526	0.6936762	3.404993	9997138	40403165	0
AAA	8519.847	0.5659391	2.636544	7905574	30422974	1
AAM	8521.645	0.5626106	2.896949	7936806	33857585	1
AMA	8520.312	0.5663576	2.639020	7913632	30452893	1
AMM	8522.047	0.5616672	3.285082	7943793	37764877	1

#### ARIMA Model

Stabilizing data: Seasonal diff = 1 & Non-Seasonal diff = 0.

Based on ACF and PACF, a first model could be ARIMA (1,0,2) (0,1,2) /12. Also testing other combination for p and q at D = 1 .



FORECASTING ASSIGNMENT  
EXERCISE 4 (Milk Data)

Ravi Shankar

	AICc	MASE_train	MASE_test	RMSE_train	RMSE_test
[1,]	7629.481	0.7467055	1.986998	10898381	25720131
[2,]	7622.069	0.7236590	1.489784	10641341	20789704
[3,]	7624.001	0.7244953	1.477663	10637385	20677428
[4,]	7622.269	0.7281873	1.512000	10647816	20906175
[5,]	7623.936	0.7225633	1.481476	10635287	20712280
[6,]	7624.037	0.7245091	1.479707	10638403	20686638
[7,]	7558.113	0.6369951	2.180927	9229568	26999383
[8,]	7499.669	0.5373948	1.126771	7885389	14803272
[9,]	7501.712	0.5374913	1.108611	7886447	14584294
[10,]	7517.256	0.5756537	1.322053	8299874	17007418
[11,]	7504.077	0.5482495	1.139493	7968654	15215542
[12,]	7501.712	0.5375355	1.106359	7886632	14561119
[13,]	7554.968	0.6213859	3.064853	9115370	37534076
[14,]	7499.001	0.5313429	1.534269	7851221	20042406
[15,]	7500.952	0.5317314	1.507230	7852448	19597443
[16,]	7513.859	0.5611402	1.994899	8194543	24739071
[17,]	7502.101	0.5377145	1.785053	7897749	22534452
[18,]	7500.952	0.5316558	1.506222	7852064	19587664

### MODEL SELECTION

SR	MODEL	Aicc	MASE TRAIN	MASE TEST	RMSE TRAIN	RMSE TEST	Damping
1	AAA	8519.847	0.566	2.637	7905574	30422974	1
2	AMM	8522.047	0.562	3.285	7943793	37764877	1
3	ETS(M,Ad,A)	8517.311	0.561	2.626	7860491	30296280	1
4	order=c(1,0,1) seasonal=c(0,1,1))	7499.001	0.531	1.534	7851221	20042406	
5	order=c(1,0,1) seasonal=c(1,1,1))	7500.952	0.532	1.506	7852064	19587664	
6	order=c(1,0,0) seasonal=c(1,1,1))	7501.712	0.538	1.106	7886632	14561119	

Selected ARIMA models failed in Ljungbox test. Best Fitted model I got is ETS(AAA) damped.

### Final Forecast with best model

