LE CLUB FRANCAIS CASE STUDY

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Question 1:

Discuss why the newsvendor model may or may not be a reasonable model for computing order quantities in this case?

Given the stochastic nature of demand, the newsvendor model appears to be a viable model after evaluating the previous information in Exhibit 1 containing Le Club's demand and prediction data, as well as reading the case. When demand is unknown, the newsvendor model is commonly used to determine the appropriate order quantity to maximize projected profit. We also know that Le Club rarely gets a second chance to acquire more wine for their selling season, which is another rationale for the newsvendor's one procurement opportunity setting. Furthermore, we are given past demand and forecast data to aid in forecasting future demand, assuming that future demand would be similar to prior data, with error and crucial ratios taken into account.

The newsvendor approach is particularly appropriate for goods with a short life cycle or perishable items, which would reduce the loss caused by French wine's heterogeneity. The challenge in forecasting French wine is partly attributable to its heterogeneity and reliance on the perspective and knowledge of a relatively small set of people - wine professionals. This has a significant impact on client demand and can make or break a season of sales. Furthermore, the concept may be a good fit because Le Club has gross margins of roughly 50%. The data we have allows us to calculate under-forecasted and over-forecasted expenses, also known as underage and overage respectively. The model may thus assist us in risk management by examining the tradeoffs between the variables.

Consider the scenario given in the case study, where the demand was anticipated to be around 10,000 bottles, while the actual demand was only around 1,700. Another Côtes du Rhône wine was expected to sell 10,000 bottles, but demand exceeded 11,000 bottles. Furthermore, white and red wines have different lifespans, with red wines being less perishable than white wines.

To account for this variability, the newsvendor model may be able to estimate the appropriate order quantity for each wine.

The newsvendor model has the disadvantage of focusing on the optimal order quantity to maximize the predicted profit. To put it another way, it disregards other considerations like customer satisfaction. There's still a chance that demand will be larger than Q. In that instance, Le Club may have to turn a customer away due to stock out.

But weighing both pros vs cons, given the company is experiencing losses owing to forecasting mistakes, it is fair to utilize the newsvendor model to compute order amounts for each wine.

Question 2:

What are the costs of having one bottle too few in inventory (underage cost)? What are the costs of having one bottle too many in inventory (overage cost)? List these costs qualitatively and then attempt to attach numbers to them for a 10 Euro bottle of white wine.

Given:
Cost of Transporting = 1.25
Cost of Procuring = 5
Salvage Value for white wine = (1-0.4)*10 = 6 (per 10 euro bottle)
Salvage Value for red wine = (1-0.3)*10 = 7 (per 10 euro bottle)
Selling price = 10

Underage / Understocking cost (Cu) :

Cu = Unit price - (Unit price + Transportation cost)

For 10 euro bottle,

Cu = 10 - (5+1.25) = **3.75 euros**

Overage / Overstocking cost (Co) :

Co = Total cost - Salvage value

where Total cost = Unit Cost + Holding Cost (storage) + Holding Cost (capital) + Cost of transporting

For white wine:

Holding Cost (storage) = 0.1 * 8months = **0.8 euro**

Holding Cost (capital) = Unit cost * 0.15 * (8/12 months) = **0.5 euro** (capital cost is 15% per annum)

Salvage Value = 10 * (1-0.4) = **6 euros**

Hence, Co for white wine = (5 + 0.8 + 0.5 +1.25) = **1.55 euros**

Critical ratio = Cu/ Co+Cu = 3.75/1.55+3.75 = 0.707 ~ **0.71**

For red wine:

Holding Cost (storage) = 0.1 * 15months = **1.5 euro**

Holding Cost (capital) = Unit cost * 0.15 * (15/12 months) = **0.9375 euro** (capital cost is 15% per annum)

Salvage Value = 10 * (1-0.3) = **7 euros**

Hence, Co for white wine = (5 + 1.5 + 0.9375 +1.25) = **1.6875 euros**

Critical ratio = Cu/ Co+Cu = 3.75/1.6875+3.75 = 0.6896 ~ **0.69**

Question 3:

Assume the underage cost is 3 Euro and the overage cost is 1 Euro. Based on Le Club's past forecasting performance (Exhibit 1), how many bottles would you order of a wine that is forecasted to sell 2000 bottles? (Assume this is the final forecast, i.e., the forecast after any potential adjustments to ensure that the aggregate forecast across all items matches some target.)

Appellation	Designation	Year	Colo	Retail price (€ per bottl	Forecast	Deman	A/F Ratio
CÔTES DU RHÔNE (6)	Dne Notre Dame des Pallières	01	Rouge	5.90	10,000	11,280	1.128
BORDEAUX SUP	Ch. Tour Petit Puch	01	Rouge	7.20	1,200	252	0.21
LIRAC	Domaine Duseigneur (Frs 19,80)	00	Rouge	10.50	900	540	0.6
CORBIERES	Ch. des Auzines "Les Garrigues"	01	Rouge	6.90	800	864	1.08
CARTON PANACHE	(4 x 3) Pts Kdo Doublés			8.20	3,000	2,169	0.723
POMEROL	Ch. Clos Bel Air	01	Rouge	22.95	900	1034	1.148888889
GRAVES	La Grande Cuvée de Dourthe	01	Rouge	9.95	600	384	0.64
HAUT-MEDOC CB	Ch. Beyzac	01	Rouge	10.70	400	414	1.035
BORDEAUX	Ch. Bordeneuve	01	Rouge	5.95	1800	612	0.34
CARTON PANACHE	4+4+2+2			13.74	3960	5436	1.372727273
CHAMBOLLE-MUSIGNY	Bouchard Père et Fils	01	Rouge	33.90	600	528	0.88
HAUTES CÔTES DE BEAUNE	Clos de la Chaise Dieu	02	Blanc	10.90	900	1014	1.126666667
MORGON	Dne de Gry Sablon - R de Clarisse	02	Rouge	9.50	1200	1500	1.25
VDP des Côteaux de L'Ardèche	La Réserve Rosé du Club	03	Rosé	3.30	2500	2,070	0.828
VDP des Côteaux de L'Ardèche	La Réserve Rouge du Club	02	Rouge	3.25	3000	2,784	0.928
VDP du Comté Tolosan	La Réserve Blanc du Club	03	Blanc	3.30	2000	1,974	0.987
Bordeaux	Réserve du Club	02	Rouge	4.50	2500	4,057	1.6228
CARTON PANACHEE	Les Réserves du Club			3.59	2600	1,992	0.766153846
IROULEGUY	Dne Etxegaraya	01	Rouge	11.90	3000	726	0.242
BERGERAC	Ch. De Fumat (6)	01	Rouge	5.90	800	402	0.5025
VDP D'OC	Chardonnay-Terret M. Laroche	02	Blanc	5.40	2500	1380	0.552
COTEAUX DU LANGUEDOC	Dne Péris	01	Rouge	6.10	900	612	0.68
BERGERAC	Ch. De Fumat	01	Rouge	5.20	1800	1170	0.65
CHINON	Wilfrid Rousse	02	Rouge	7.55	1500	960	0.64
COTEAUX DU GIENNOIS	Balland-Chapuis	02	Blanc	7.30	3000	2100	0.7
ROSE DE LOIRE	Cave des Perrières	03	Rosé	5.50	2300	2934	1.275652174
CHÂTEAUNEUF DU PAPE	Clos de l'Oratoire des Papes	00	Rouge	19.95	300	703	2.343333333
CDR VILLAGES CAIRANNE	Dne Croc de Romet	02	Rouge	8.90	500	480	0.96
CÔTES DU VIVARAIS	Beaumont des Gras - C. Prestige	01	Rouge	4.70	2700	1968	0.728888889
CARTON PANACHEE	(6+4+2)			13.73	1800	1356	0.753333333
CÔTES DU JURA V. JAUNE	Fruitière de Voiteur	93	Jaune	29.50	300	324	1.08
APREMONT	Le Vigneron Savoyard	02	Blanc	7.50	1200	567	0.4725
CÔTES DU JURA	Chardonnay bâtonné	00	Blanc	8.90	900	741	0.823333333
SAINT-ESTEPHE	Ch. Haut-Corbian	00	Rouge	12.47	2100	1910	0.90952381
FITOU	Ch. Lahore-Bergez	00	Rouge	6.83	2000	1176	0.588
CDR	Dne de la Présidente	01	Rouge	5.18	2200	1788	0.812727273
COUR-CHEVERNY	Dne de Montcy	99	Blanc	6.17	900	834	0.926666667
MEDOC	Ch. Haut-Lignan	00	Rouge	6.38	2100	2208	1.051428571
RULLY	Dne Briday	01	Blanc	9.71	1100	1191	1.082727273
MONTAGNE ST-EMILION	Ch. Les Petites Rangats	02	rouge	10.40	10000	1704	0.1704
						Min	0.1704
						Max	2.343333333
						Avg	0.865281283
						Std dev	0.397792983
						NORM.INV	2265.544862

Given:

Estimate = 2000 Bottles

Underage Cost [Cu] = 3 and Overage Cost [Co]= 1

Now we calculate the critical ratio:

Critical Ratio = Underage Cost/ (Underage Cost + Overage Cost)

$$= Cu/(Cu+Co) = 3/(3+1) = ¾ = 0.75$$

We know that to maximize the expected profit Q is such that the demand would be less than or equal to Q with probability of 75%

Based on the above excel screenshot:

The mean A/F ratio = 0.865

The standard deviation of A/F ratio = 0.398

Since the forecast is 2000 bottles,

Mean of demand = Mean(A/F) * F = 0.865 * 2000 = 1730

Standard deviation of demand = Stddev(A/F) * F = 0.397 * 2000 = 794
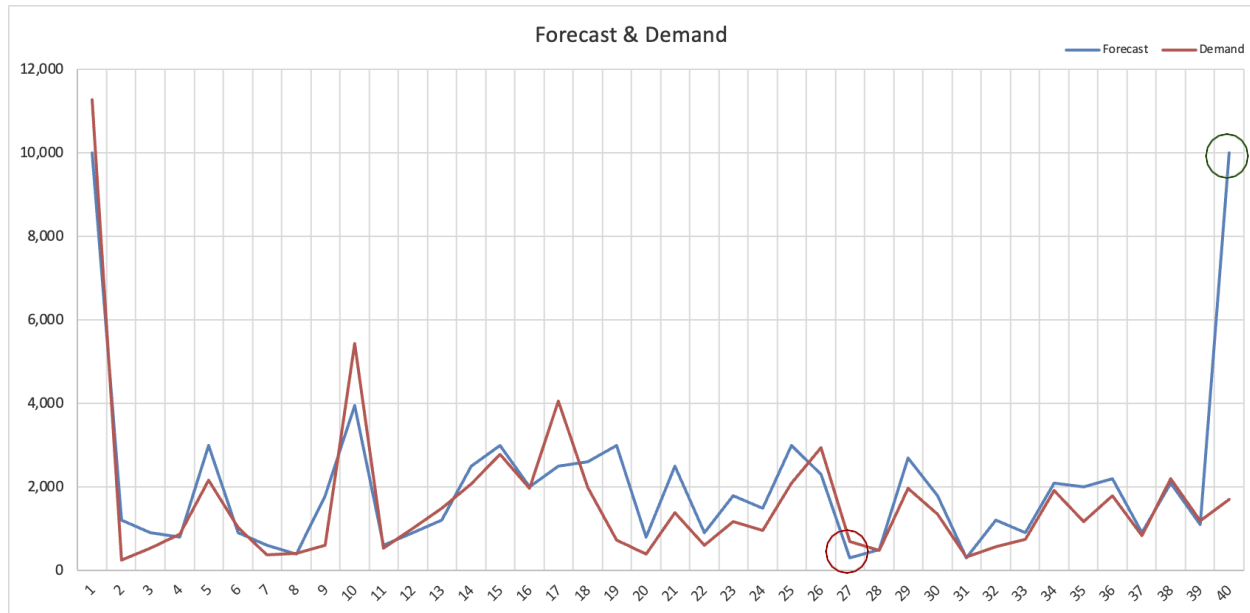

Q* = NORM.INV(CriticalRatio,Mean,Stddev)

$$= NORM.INV(0.75,1730,794) = 2265.54 \text{ bottles} \sim 2266 \text{ bottles}$$

=> Therefore, for a forecast of 2000 bottles, we recommend an order of 2266 bottles of wine.

Question 4:

Look into trends in the demand and forecast data. Do you see any bias in the forecast? Do you see any correlations between the price of wine and the forecasting error?

Appellation	Designation	Retail price (€ per bottle)	Forecast	Demand	A/F Ratio	Error	Abs Error
CÔTES DU RHÔNE (6)	Dne Notre Dame des Pallières	5.90	10,000	11,280	1.128	-1,280	1280
BORDEAUX SUP	Ch. Tour Petit Puch	7.20	1,200	252	0.21	948	948
LIRAC	Domaine Duseigneur (Frs 19,80)	10.50	900	540	0.6	360	360
CORBIERES	Ch. des Auzines "Les Garrigues"	6.90	800	864	1.08	-64	64
CARTON PANACHE	(4 x 3) Pts Kdo Doublés	8.20	3,000	2,169	0.723	831	831
POMEROL	Ch. Clos Bel Air	22.95	900	1034	1.148888889	-134	134
GRAVES	La Grande Cuvée de Dourthe	9.95	600	384	0.64	216	216
HAUT-MEDOC CB	Ch. Beyzac	10.70	400	414	1.035	-14	14
BORDEAUX	Ch. Bordeneuve	5.95	1800	612	0.34	1,188	1188
CARTON PANACHE	4+4+2+2	13.74	3960	5436	1.372727273	-1,476	1476
CHAMBOLLE-MUSIGNY	Bouchard Père et Fils	33.90	600	528	0.88	72	72
HAUTES CÔTES DE BEAUNE	Clos de la Chaise Dieu	10.90	900	1014	1.126666667	-114	114
MORGON	Dne de Gry Sablon - R de Clarisse	9.50	1200	1500	1.25	-300	300
VDP des Côteaux de L'Ardèche	La Réserve Rosé du Club	3.30	2500	2,070	0.828	430	430
VDP des Côteaux de L'Ardèche	La Réserve Rouge du Club	3.25	3000	2,784	0.928	216	216
VDP du Comté Tolosan	La Réserve Blanc du Club	3.30	2000	1,974	0.987	26	26
Bordeaux	Réserve du Club	4.50	2500	4,057	1.6228	-1,557	1557
CARTON PANACHEE	Les Réserves du Club	3.59	2600	1,992	0.766153846	608	608
IROULEGUY	Dne Etxegaraya	11.90	3000	726	0.242	2,274	2274
BERGERAC	Ch. De Fumat (6)	5.90	800	402	0.5025	398	398
VDP D'OC	Chardonnay-Terret M. Laroche	5.40	2500	1380	0.552	1,120	1120
COTEAUX DU LANGUEDOC	Dne Péris	6.10	900	612	0.68	288	288
BERGERAC	Ch. De Fumat	5.20	1800	1170	0.65	630	630
CHINON	Wilfrid Rousse	7.55	1500	960	0.64	540	540
COTEAUX DU GIENNOIS	Balland-Chapuis	7.30	3000	2100	0.7	900	900
ROSE DE LOIRE	Cave des Perrières	5.50	2300	2934	1.275652174	-634	634
CHÂTEAUNEUF DU PAPE	Clos de l'Oratoire des Papes	19.95	300	703	2.343333333	-403	403
CDR VILLAGES CAIRANNE	Dne Croc de Romet	8.90	500	480	0.96	20	20
CÔTES DU VIVARAIS	Beaumont des Gras - C. Prestige	4.70	2700	1968	0.728888889	732	732
CARTON PANACHEE	(6+4+2)	13.73	1800	1356	0.753333333	444	444
CÔTES DU JURA V. JAUNE	Fruitière de Voiteur	29.50	300	324	1.08	-24	24
APREMONT	Le Vigneron Savoyard	7.50	1200	567	0.4725	633	633
CÔTES DU JURA	Chardonnay bâtonné	8.90	900	741	0.823333333	159	159
SAINT-ESTEPHE	Ch. Haut-Corbian	12.47	2100	1910	0.90952381	190	190
FITOU	Ch. Lahore-Bergez	6.83	2000	1176	0.588	824	824
CDR	Dne de la Présidente	5.18	2200	1788	0.812727273	412	412
COUR-CHEVERNY	Dne de Montcy	6.17	900	834	0.926666667	66	66
MEDOC	Ch. Haut-Lignan	6.38	2100	2208	1.051428571	-108	108
RULLY	Dne Briday	9.71	1100	1191	1.082727273	-91	91
MONTAGNE ST-EMILION	Ch. Les Petites Rangats	10.40	10000	1704	0.1704	8,296	8296
					Min	0.1704	
					Max	2.343333333	
					Avg	0.865281283	
					Std dev	0.397792983	
					NORM.INV	2265.544862	

From the above graph, we can see that there is a slight correlation between the forecasted values and demand values. The two extreme cases are MONTAGNE ST-EMILION with an A/F ratio of 0.174 (min overage cost marked with green circle) and CHÂTEAUNEUF DU PAPE with an A/F ratio of 2.344 (max underage cost marked with red circle). We also know that they are mostly overstocked since the mean A/F is 86.5% which is more than the critical ratio (75%).

Graph 2
Price*100 v/s Absolute Error

Graph 3
Price v/s Absolute Error
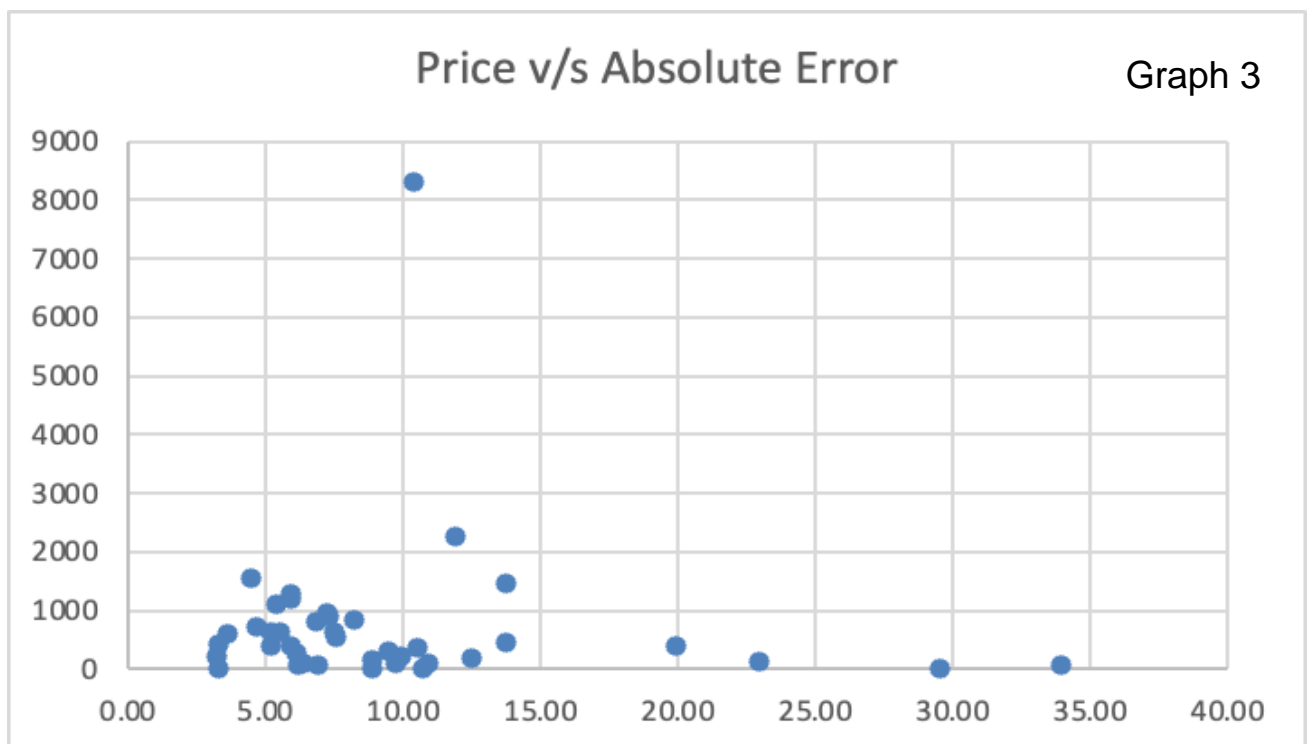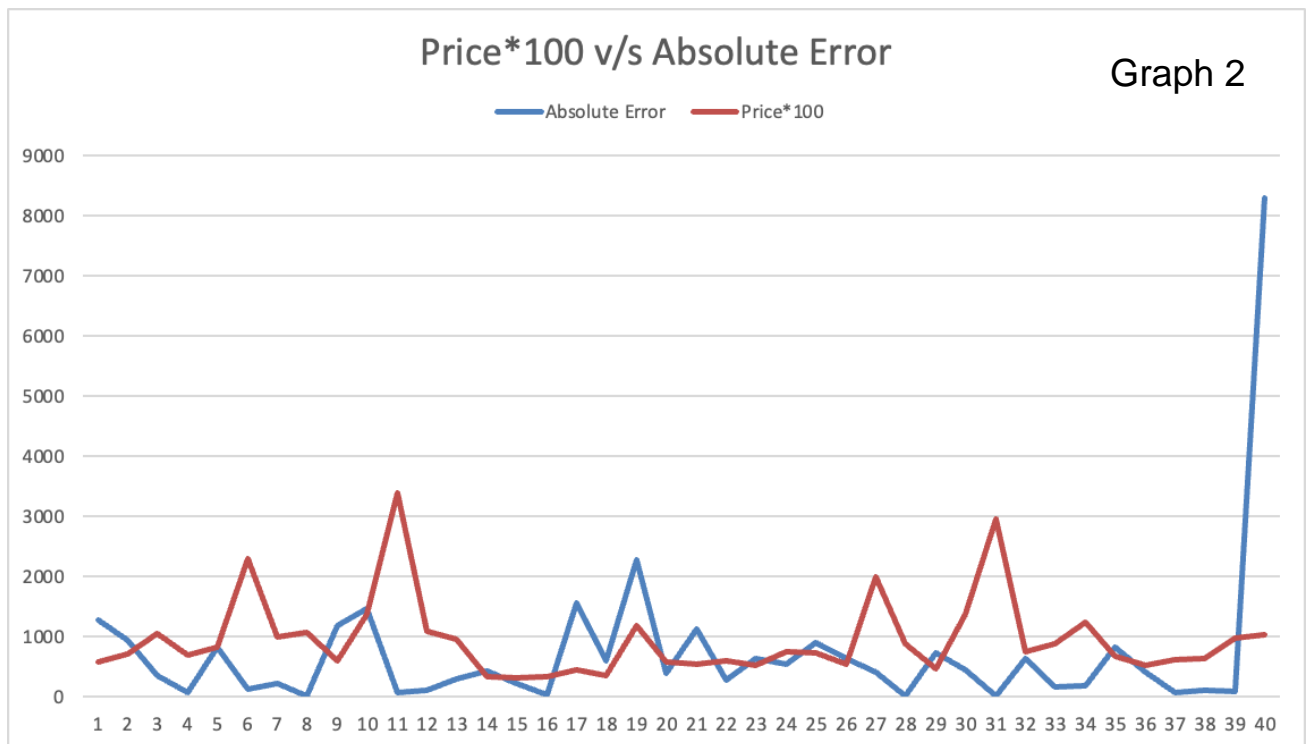
We multiply the price by 100 to measure data on the same scale and see how it relates to the absolute error (in Graph 2). We can notice that the

error is small with high prices and vice-verse from Graph 2. This correlation can be supported by Graph 3. Hence, prices are inversely proportional to the error. The company fails to make profit because of their excessive underage and overage costs.

Question 5:

How much of each wine listed in Exhibit 2 would you order? As Zanella's consultant, think of how you would convey key findings without presenting calculations for every single wine.

The forecasting of wines in Exhibit 2 can be calculated using the data given from the January 2004 catalog. We can determine error values and A/F ratio, through which we can calculate Expected Actual Demand and Standard Deviation of Actual Demand. We can also calculate Optimal Order Quantity using excel by the formula:

NORM.INV (critical ratio, mean, standard deviation).

To say, if we consider VDP des Côteaux de L'Ardèche as the designation,

Using the data of A/F & critical ratio of the same VDP des Côteaux de L'Ardèche in Exhibit 1,

Therefore,

Expected Actual Demand = A/F * Forecast = 0.865 * 3000 = 2580 bottles

Std. deviation of actual demand = Std. deviation of A/F * Forecast

= 0.4*2500 = 1000 bottles

Optimal Order Quantity = NORM.INV (0.04, 2422, 1114) = **518 bottles**

Suggestions:

1. Underage and Overage Costs: The overage costs increase, and underage costs decrease as the retail price decreases, it is recommended to order more of the higher price wines. Also, the top 4 priced wines are Red wines, which can be stored for a long time compared to White wines.

2. Order quantity vs Estimated demand: For higher priced wines, as the order quantity is more than estimated demand, we must be careful while ordering higher quantities.

3. For wines in which prices are between 9 and 5 Euro, the difference between Underage costs and overage costs are less than 1 Euro. So, it is recommended to order similar to estimated demand.

4. For the wines in which prices are between 5 Euro, as the overage costs are more than underage costs, it is better to order quantities less than the estimated demand.
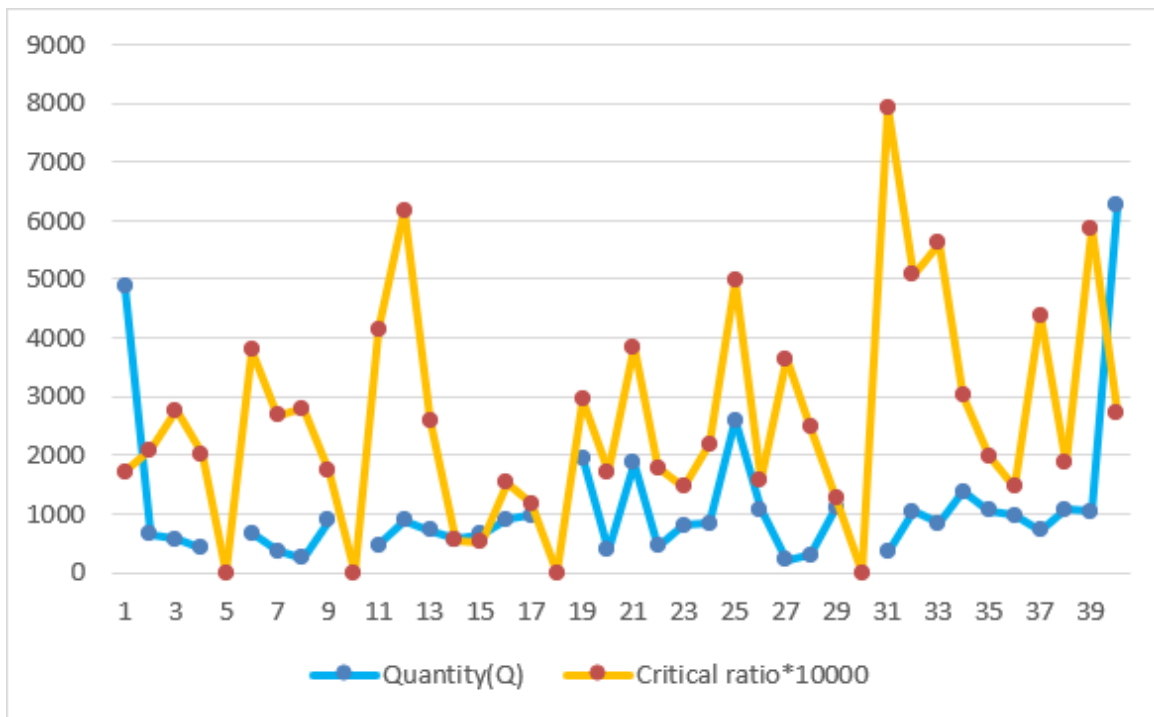
Question 6:

Discuss patterns and any peculiarities that you find in the order quantities and critical ratios across different wines.

As per our analysis, we made the following observations related to order quantities and critical ratios across different wines.

- The actual demand and the forecasted demand from Exhibit 1 show that out of 40 wines, 27 types are over-forecasted and 13 are under forecasted. This shows that there is a high likelihood of over estimating the demand.
- The A/F ratio (which gives the relative error) indicates that more demand is inflated by a margin of 50 percent or more.

- Cu is more costly than Co, this indicates that keeping low stocks is costlier than keeping high stocks. So, being overstocked is better than being understocked. This may be due to the 50% margin.
- This also proves why Quantity is an important factor.
- The ordered quantity is similar to the forecasted values. But for a few wines, the demand was quite high compared to the forecast. For Bordeaux, the forecast was 2500 but the demand was 4057.
- There is an inversely proportional relationship between Order quantity and critical ratio.As the critical ratio increased, Q decreased.

Question 7:

Explain if the order quantities make sense from a customer service standpoint (e.g. price, availability, quality, etc.).

- Wines with higher price - Customers opting for expensive wines have the option to buy the wine they want as the demand is less than the order quantity.

- But for low priced wines, the demand is greater than the order quantity. So, customers who want low priced wines will have to opt for expensive wines.

- The company's image will go down because customers will not be satisfied with the no or low options to buy wines of their choice.

- With forced ways to buy different wines, the demand of wines can fluctuate as the customer will not be satisfied.