Data Specialist

Groupon Exercise

1/10/2020

Background

We are in January 2014 and need to make a buy or sell recommendation for Groupon stock based on its performance in Q4 2013 before February 2014. The estimation will be done based on the Groupon 4Q13 data we have collected. Currently, the existing Groupon data includes the billings and units sold for the deals that are active during Q4 2013. However, the problem we are facing is that the database broke from October 20 to October 30, 2013, thus, the Local deals that started during this period are not included. In this research, we will first deal with the missing data during the system downtime, then, we will focus on the estimation of Groupon's gross billings and units sold and the buy and sell recommendation for its stock.

Data Adjustment

Considering that we do not have the data for the deals that started between October 20 and October 30, 2013, we may first need to project and add the missing data during this period. The estimation could be done by either checking the data patterns and adjusting the data based on the patterns or using the average amount in Q4. Thus, we could try to find the data patterns first to see if there is a chance for us to improve the accuracy of estimation.

Method

To discover the data patterns, I collected the Local data of October and November from the existing data file. In Python, the billing amount and units sold were summed up and plotted by the started date, which is shown below. The left chart shows the time series analysis for billing amount, while the left one is for units sold.

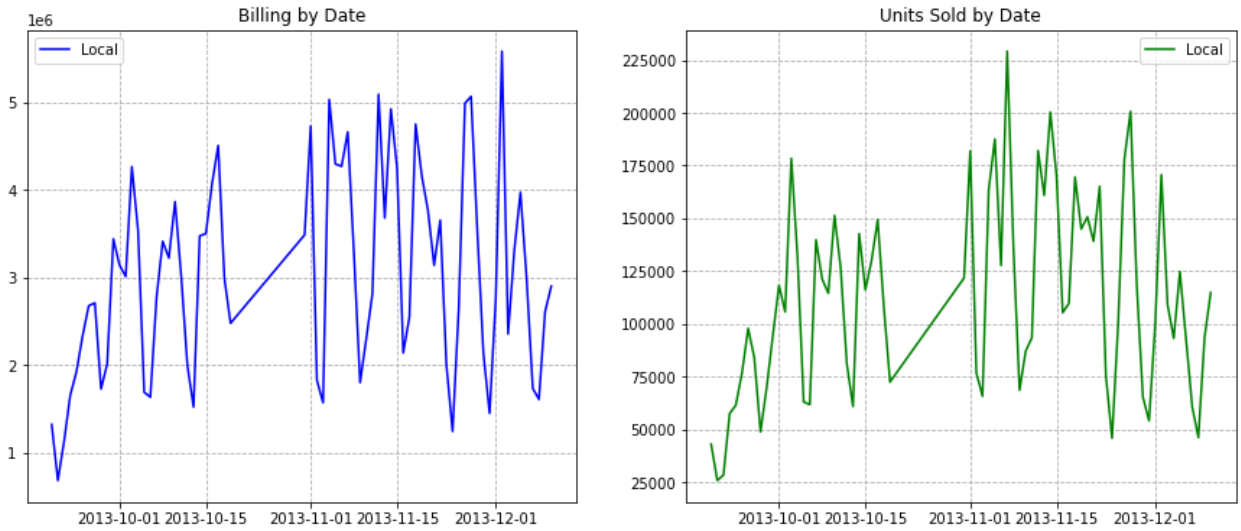

Chart 1. Billing and Units Sold by Date

As we could see from both charts, the billing and units sold data shows strong cyclicity in October and November. It is evident that the sales activities change with the started date. In each cycle, the sales of the deals that started on the first date and last date are way too much lower than the others in Q4.

Moreover, based on the preliminary observation, it shows the length of each cycle is almost the same. However, more research needs to be done to support our observation and improve the understanding of the data patterns.

To further the research on cyclicity, it is vital to understand the length of each cycle. This would help us gain a better understanding of how the pattern exactly looks like and propose a more accurate estimation for the missing part. Thus, in Python, the codes were executed to find the date for the minimum point in each cycle. The dates we got are shown below.

```
['2013-09-21', '2013-09-28', '2013-10-06', '2013-10-13', '2013-10-19', '2013-11-03', '2013-11-09', '2013-11-16', '2013-11-24',
'2013-11-30', '2013-12-03', '2013-12-08']
```

Figure 1. Date for the Minimum Point of Billings and Units Sold

After checking these dates in chart 1 above, we could find the actual cyclicity started from September 28, 2013 and ended on November 30, 2013 because the patterns of the other cycles are not evident and strong. Also, since the cycles started between October 13, 2013 and November 3, 2013 contains missing data, we would also remove them for the research. Therefore, the research will only focus on the data during two periods, one is from September 28, 2013 through October 13, 2013, and the others are from November 3, 2013 through November 30, 2013. From the calculation in Python, the lengths of the cycles during this period are 8, 7, 6, 7, 8, 6 days, respectively, and the average length is 7 days.

By using the available data during the 42-day period that we defined, we got the sum and average of billings and units sold during the period. The sum and average of billings are $ 133,209,364.59 and $ 5,135,113.5, respectively. The sum and average of the units sold are 2,114,434.36 and 81,509.74, respectively.

As the period with missing data is from October 13, 2013 through November 3, 2013, which contains 21 days, it is interesting to note that, in this period, there are three full cycles just right, which also increases the validity of the calculation method. Then, by multiplying average numbers above by the length of this period (5,135,113.5 x 21), we reached the total amount of the billings and units sold during the period of three cycles. Afterwards, the billings and units sold during the period without data could be arrived at by subtracting the data of known period (Oct 13 – Oct 19 and Oct 31 – Nov 3) from the total amount we just got. The summary of results is shown in table 1.

	Oct 13, 2013 – Nov 3, 2013	**Oct 20, 2013 – Oct 30, 2013**
Billing	44,403,121.53	13,335,994.76
Units Sold	1,711,704.50	612,559.90

Table 1. Billing and Units Sold by Date Range

Up to here, the numbers of billing and units sold have been added. We may be able to use the same approach to get the number of new deals that started between October 20, 2013 and October 30, 2013. We first plotted the data by date, which is shown in chart 2.

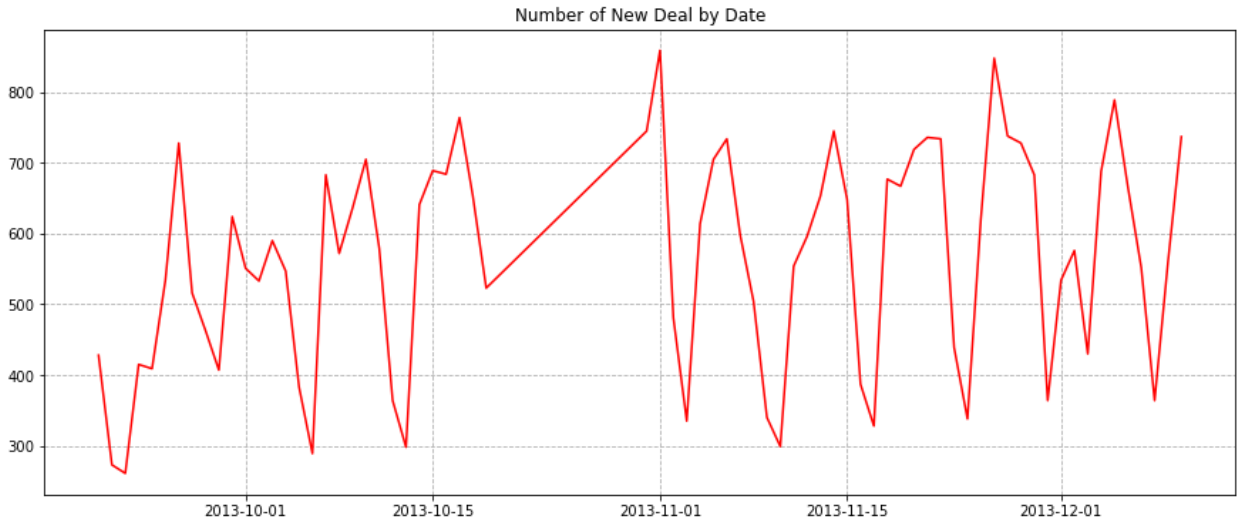

Chart 2. Number of New Deals by Date

From the chart 2, we could also easily find the cyclicity, which consolidates our guess that we could also use the same approach to handle the missing data for the new deals. Based on the data provided by Python, we could see the dates of the minimum points of each cycle are shown in figure 2. By using the same method that we used for billings and units sold, we got the number of new deals that started during the period we are researching, which is shown in table 2.

```
['2013-09-29', '2013-10-06', '2013-10-13', '2013-11-03', '2013-11-10', '2013-11-17', '2013-11-24', '2013-11-30']
```

Figure 2. Date of the Minimum Points of New Deals

	Oct 13, 2013 – Nov 3, 2013	Oct 20, 2013 – Oct 30, 2013
New Deals	7,685	1,646

Table 2. The Number of New Deals by Date

Data Patterns

Based on the discussion about the method we used in the research, we mentioned the data patterns we have found. The most evident pattern in the data is cyclicity. Each will last from 6 days to 8 days; however, the average length is 7 days. After analyzing the dates of valley data, we have the result shown in table 3.

Date	Weekday
9/28/2013	Saturday
10/6/2013	Sunday
10/13/2013	Sunday
11/3/2013	Sunday
11/9/2013	Saturday
11/16/2013	Saturday
11/24/2013	Sunday
11/30/2013	Saturday

Table 3. Date and Weekday

We found a more interesting result; the valley always happens during the weekend. In other words, the deals that started on the weekend had worse performance compared with the deals that started on workdays in October and November.

This truly drives our interests in the data patterns. Therefore, I plotted the billing and units sold data for all the data we have by the date, which is shown in chart 3.

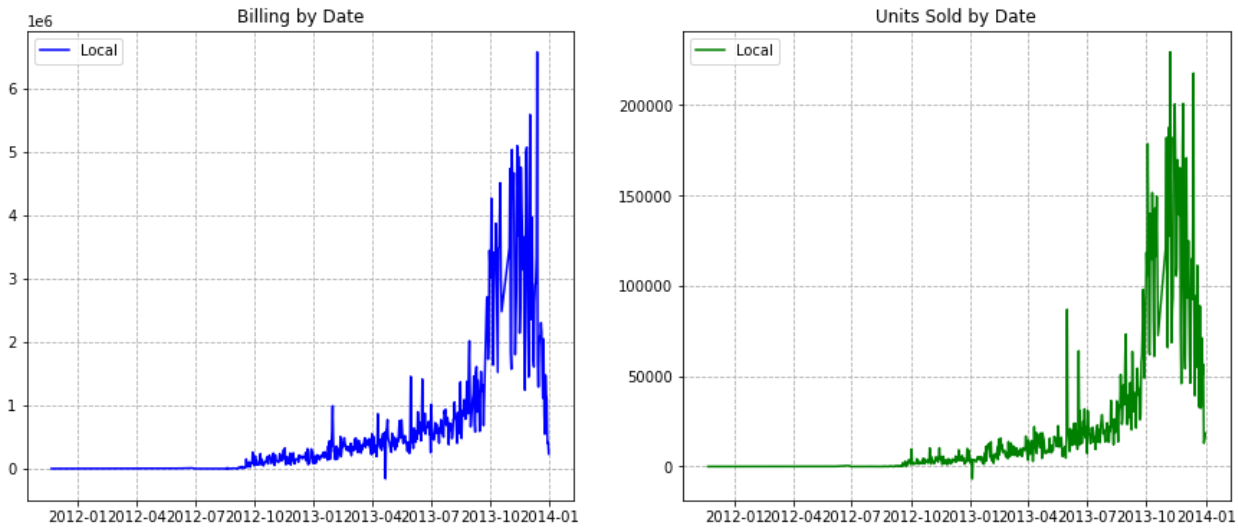

Chart 3. Billing and Units Sold by Date (All deals in 4Q13)

A discovery uncovered here. We could clearly see from the data that deals that started around November had the highest billings and units sold in 4Q13 and there is a big drop for the deals in December. The probable reason behind this is, with the approach of the holiday season, customers would like to purchase more and check deals on Groupon more frequently, and merchants would also like to put more deals on Groupon. Because newer deals would be ranked higher, more November deals could be spotted and purchased compared to October. For the December deals, there are two possible reasons for sluggish sales. One reason is the purchase ability decreases as the shopping season passes; the other reason could be the length of sales for these deals are not enough, for example, most were even shorter than 15 days, thus, they did not gain enough attention or sales in Q4.

Last, I did one more research on the data patterns of the number of new deals that are still active during Q3. The result is shown in chart 4.

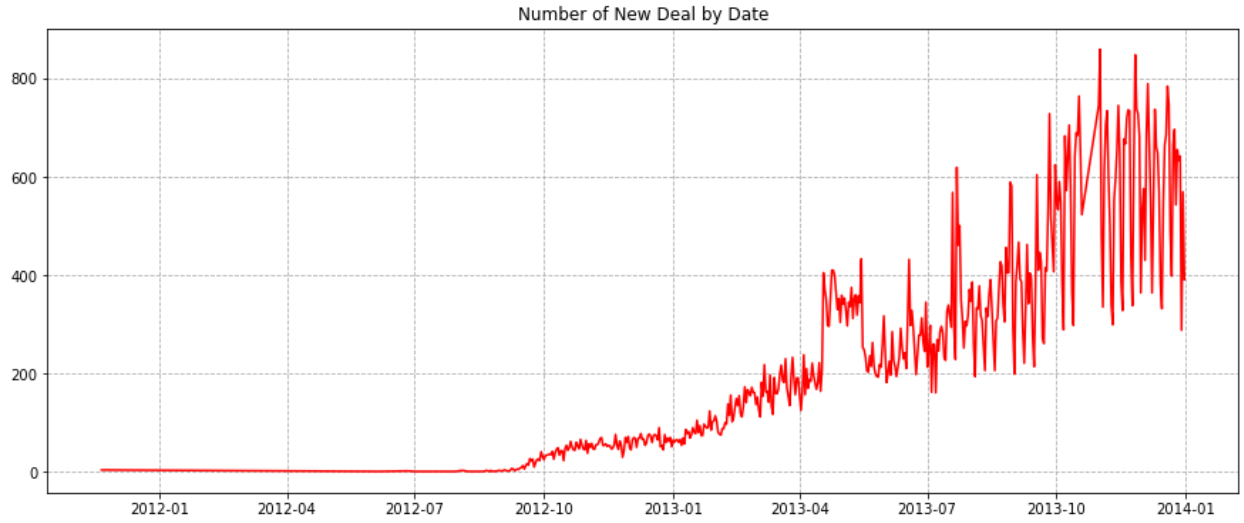

Chart 4. Number of Deals that are Active in 4Q13.

By analyzing chart 3 and chart 4, we could see four patterns.

1. For the deals that last for over 15 months, most of them either did not have evident sales amounts or are not available in Groupon.
2. For the deals that last for over 9 months but no more than 15 months, they showed an almost linear increase in sales as well as the number of deals available over the time.
3. For the deals that last over 3 months but no more than 9 months, these deals' sales are similar and strong but have large fluctuations, but they are not as good as the deals starting from Q4.
4. For the deals starting in Q4, they have the most active and strong sales. Although December deals did not perform as well as the deals in the other two months, they are still better than most of the deals starting before Q4.

This trend or pattern provides us with deep insights into the sale strategy on Groupon. However, this research mainly focuses on financial performance in 2013, we would not have further discussion into this.

Till now, because of the discovery of the cyclicity and data patterns, all missing data has been added based on the method we used. In the next step, billing estimation will be discussed.

Billing Estimation

Because of the loss of the sales data for each month of quarter 4, 2013, only quarterly billing, units sold, and new deals will be presented here. Therefore, we got the estimated billing statement shown in table 3.

	Q3 2012	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013
Billings ($ million)						
Local	$408.9	$431.1	$469.1	$459.2	$410.4	$422.6
Goods	$110.5	$213.7	$144.3	$201.6	$191.5	$282.2
Travel	$46.5	$49.7	$56.5	$64.6	$66.9	$70.6
Total	**$566.0**	**$694.5**	**$669.9**	**$725.4**	**$668.8**	**$775.4**

	Q3 2012	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013
Units Sold						
Local	13,626,329	15,599,997	15,685,071	16,156,294	14,866,065	14,537,040
Goods	3,647,863	6,378,652	4,773,079	7,847,825	7,086,349	10,419,746
Travel	206,521	255,394	224,537	389,192	317,184	378,910
Total	**17,480,714**	**22,234,043**	**20,682,687**	**24,393,310**	**22,269,598**	**25,335,697**

	Q3 2012	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013
New Deals Started						
Local	39,283	43,832	37,262	38,886	37,918	48,626
Goods	1,307	3,159	3,688	6,550	8,530	12,749
Travel	705	866	636	1,258	1,614	2,177
Total	**41,295**	**47,857**	**41,586**	**46,694**	**48,062**	**63,552**

Table 3. Estimated Billing Statement

As we could see from the billing statement, in Q4 2013, Groupon reached the highest billing, units sold, and new deals started in 2013. Also, all numbers in Q4 are much higher than the numbers for the same period last year. This also shows a strong indication that Groupon is in fast development.

Recommendation

Recommendation

Neutral

Logics for the recommendation

Positive Side

1. Company Development
   a. Investments in the improvement of user-experience
      Groupon puts large investment into the tools that facilitate merchants and customers. With the debut of its mobile app, more customers would be willing to use Groupon because of the improvement of usability and convenience. With the publication of merchant tools, Groupon will also draw more merchants to join the network of Groupon because of the potential opportunity for an increase in revenue and customer traffic.

b. New Strategy
   For customers, Groupon decided to take advantage of activating and retaining customers instead of customer acquisition, which will decrease the operational expense and increase the profit. Since Groupon already has a huge number of customers and published its mobile application, the ease of using and accessing the deals will lead to another wave of the increase in the customer. The increase in the customers would ultimately cause the raise of revenue as well as the stock price.

2. Marketing Expectation
   Based on the reports from the most well-known institutions, currently, the market widely accepted estimated Q4 billing for Groupon is between $ 715 million and $ 740 million. The expected yearly billing is between $ 2,520 million and $ 2,615 million. However, based on the estimated billing we got from Groupon's sales data, we know that the actual billing should be around $ 2,839.5 million in 2013, which largely exceeded the market's expectation, this would be a strong momentum for the raise of the stock price.

Negative Side

1. Uncertainty of the international business
   Since there is no signal indicating the increase in international sales, I would assume that Groupon still underperformed in the markets outside N.A. In other words, I believe most of the billings outside N.A. should follow the trend and change around the number of Q3. With a 90% confidence level and using the t-test for the historical data from Morgan Stanley Research, the gross billing of Europe, the Middle East and Africa (EMEA) Local deals in these markets should be between $ 194 million and $ 207 million; the gross billing of EMEA Goods should be between $ 170 million and $ 210 million; the gross billing of EMEA Travel and Other should be between $ 55 million and $ 92 million; the gross billing of Rest of the World Local deals in these markets should be between $ 100 million and $ 159 million; the gross billing of Rest of the World Goods should be between $ 63 million and $ 95 million; the gross billing of Rest of the World Travel and Other should be between $ 27 million and $ 53 million. In the calculation, we removed 1Q12 because the data are either way too much higher than others or missing. The summary is shown in table 4.

EMEA - Local Deals							EMEA - Goods					
2Q12	271	Mean	233.50	Upper	297.30		2Q12	124	Mean	160.50	Upper	213.80
3Q12	183	STDEV	32.89	Lower	169.70		3Q12	147	STDEV	27.47	Lower	107.20
4Q12	240	t-statistics	1.94				4Q12	205	t-statistics	1.94		
1Q13	259						1Q13	149				
2Q13	241						2Q13	168				
3Q13	207						3Q13	170				
EMEA - Travel and Other												
2Q12	68	Mean	74.33	Upper	92.93							
3Q12	66	STDEV	9.58	Lower	55.74							
4Q12	88	t-statistics	1.94									
1Q13	84											
2Q13	74											
3Q13	66											
Rest - Local Deals							Rest - Goods					
2Q12	152	Mean	129.83	Upper	159.62		2Q12	75	Mean	79.50	Upper	95.90
3Q12	145	STDEV	15.35	Lower	100.05		3Q12	77	STDEV	8.46	Lower	63.10
4Q12	129	t-statistics	1.94				4Q12	96	t-statistics	1.94		
1Q13	120						1Q13	78				
2Q13	115						2Q13	72				
3Q13	118						3Q13	79				
Rest - Travel and Other												
2Q12	48	Mean	40.83	Upper	53.96							
3Q12	48	STDEV	6.77	Lower	27.71							
4Q12	44	t-statistics	1.94									
1Q13	36											
2Q13	32											
3Q13	37											

Table 4. t-test for the billing of markets outside N.A.

Based on the estimation for the billings, the number normally should change according to the trends of each billing. Most of the market estimations either exceeded or were close to the upper bound of the t-test. While the reports from the market estimated the 4Q13 optimistically, the net income that would be shown in the 2013 financial statement would be much lower than their expectations. Thus, this could be a severely negative impact on the Groupon stock price.

Therefore, by analyzing the positive sides and negative sides that could impact Groupon stock price, I would prefer to give a NEUTRAL recommendation until further updates from Groupon or the market before the publication of the 2013 financial reports.