COVID-19 EFFECTS ON CONSUMER BEHAVIOR

Presented by Group: Conservatory

MEET THE TEAM

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Presentation Outline

TODAY'S SUBTOPICS

- Monthly U.S. Confirmed Cases
- Retail Sales by Category
- Percent Change of Retail sales
- Time Series of Retail Grocery Sales Over 10 Years
- Retail Grocery Sales
- Retail Grocery vs. COVID-19
- Total Retail Sales vs. E-Commerce
- Retail Grocery vs. E-Grocery
- Conclusion

What We Looked At

COVID-19

Since the beginning of the year, the spread of coronavirus disease and the actions taken in response to it drastically changed all aspects of our lives. As many places instituted stay-at-home orders in an effort to limit the spread of COVID-19.

RETAIL: GROCERY

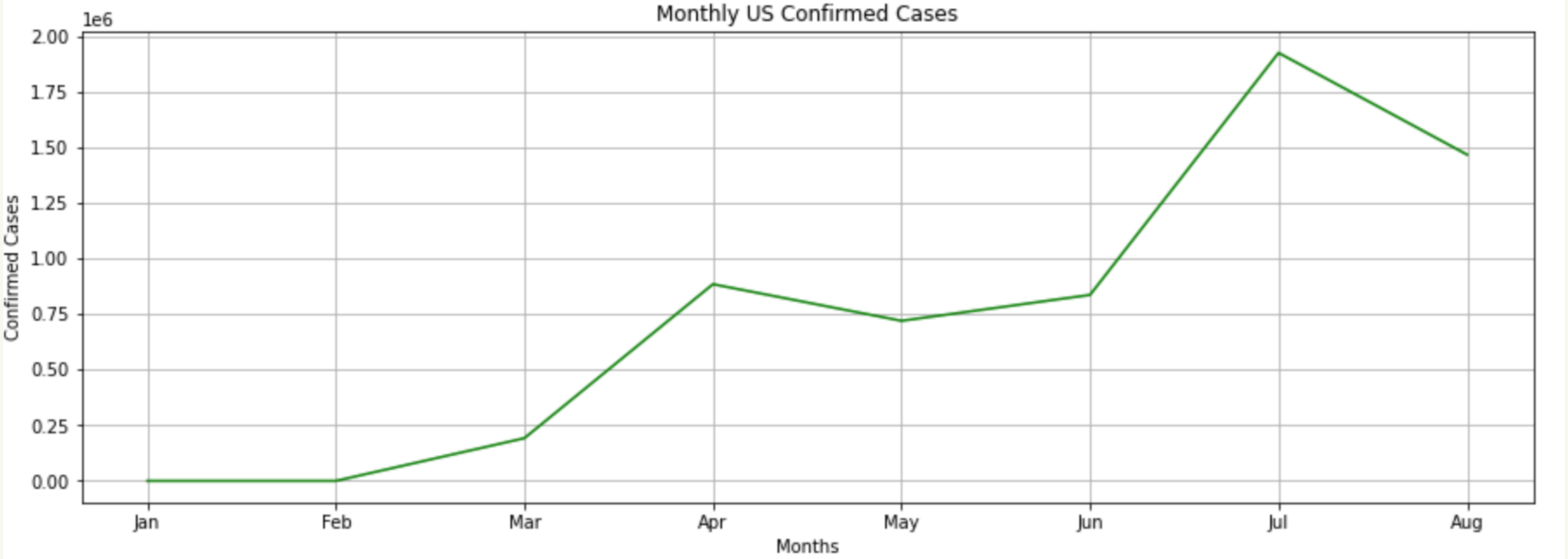
As time passed, there have been a variety of changes to the way we shop and where we shop. Consumers were unaware of how long they would be quarantined at home for and increased their purchase of food and grocery supplies.

RETAIL: E-COMMERCE

Many of us have switched to shopping online as stores and plazas closed down. E-grocery tools like Instacart, Amazon Fresh, and Thrive have seen unprecedented popularity as consumers who want to minimize their exposure to coronavirus in a grocery store look to other shopping methods

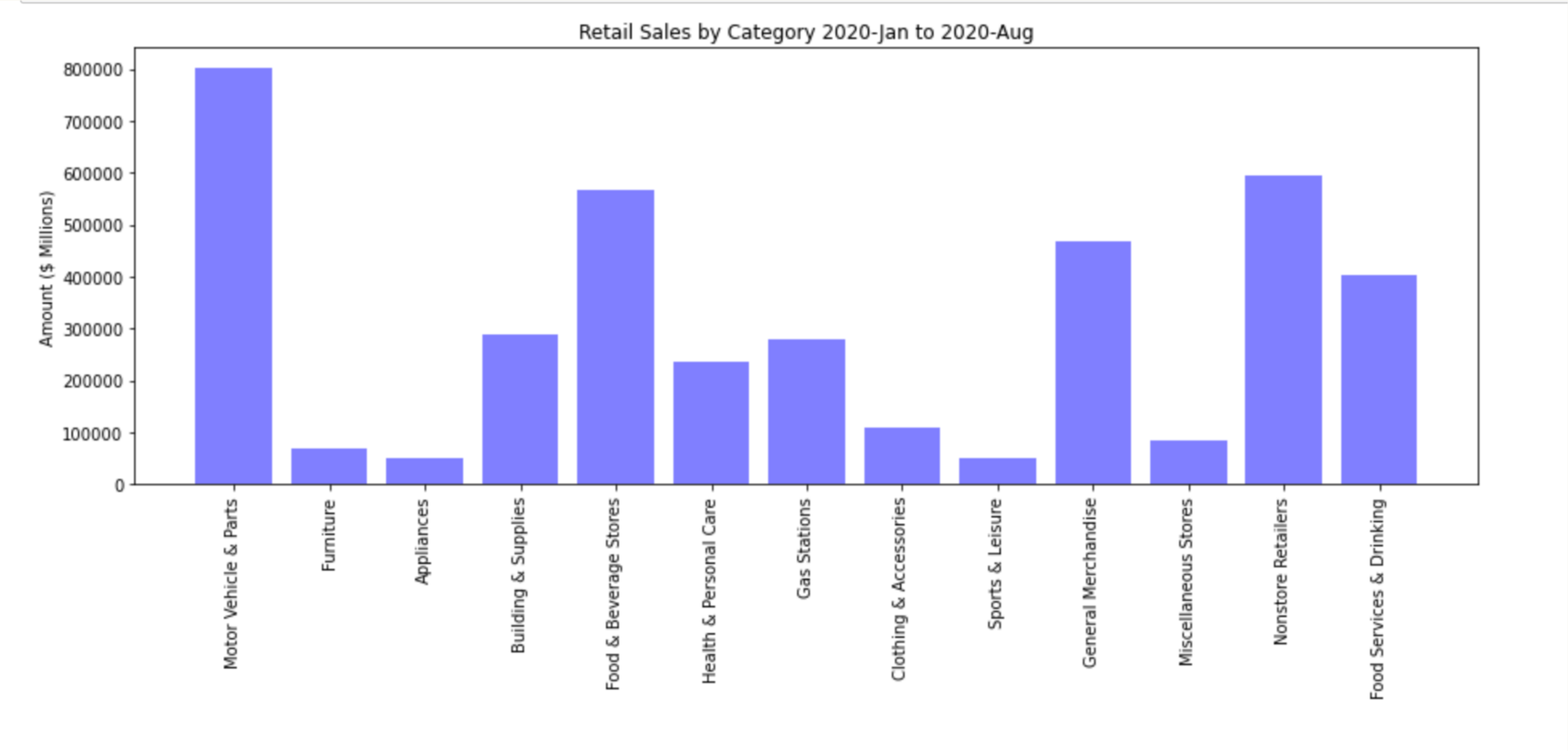
US MONTHLY CONFIRMED CASES

An analysis of the trend of confirmed COVID-19 cases found in the US.
- First case being confirmed at the end of January with drastic increases over the last few months
- July recorded the highest count of confirmed cases with more than 75,000 confirmed cases
- How does this trend of confirmed cases affect consumer behavior?



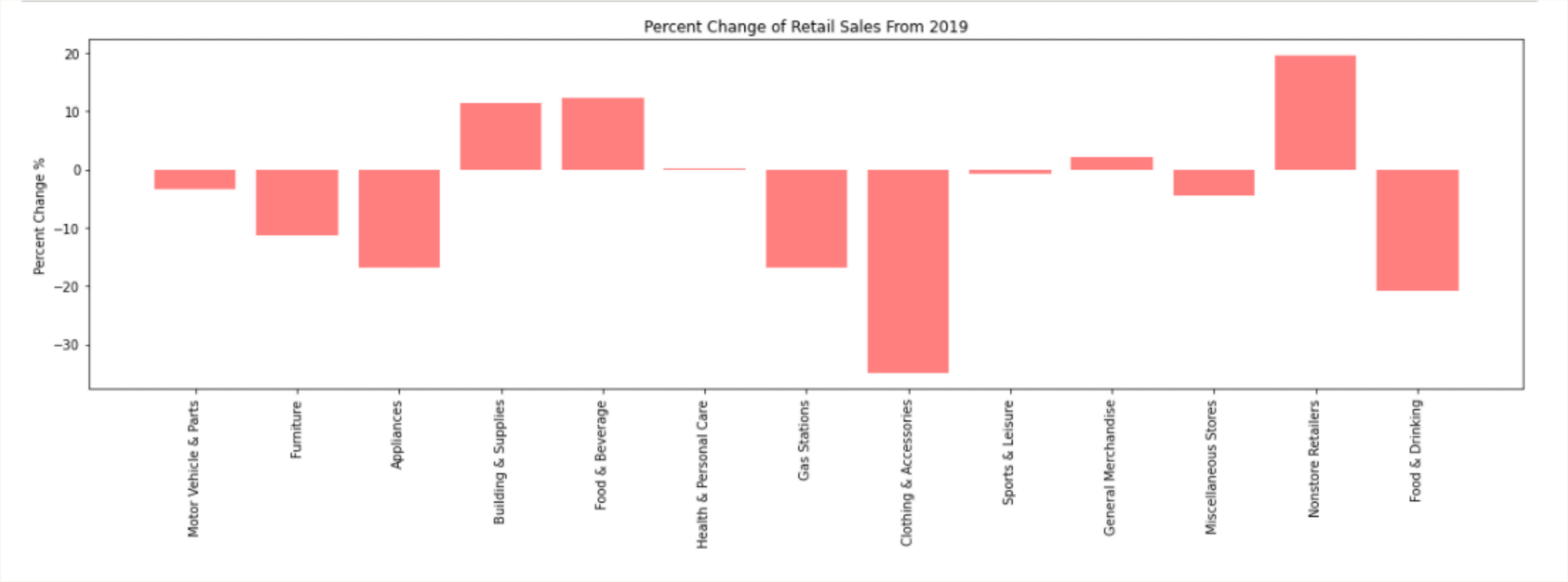
RETAIL SALES BY CATEGORY

Prior to taking a dive into retail food shopping habits during the pandemic, we first had to take a broader look at how retail sales were doing overall since the year began. This bar graph depicts total retail sales figures sourced from United States Census data of the period between January 2020 and August 2020. Rather than simply looking at the retail sector with the highest sales figures, we wanted to focus more on the food-related categories seeing as how food is truly a necessity in our everyday life.



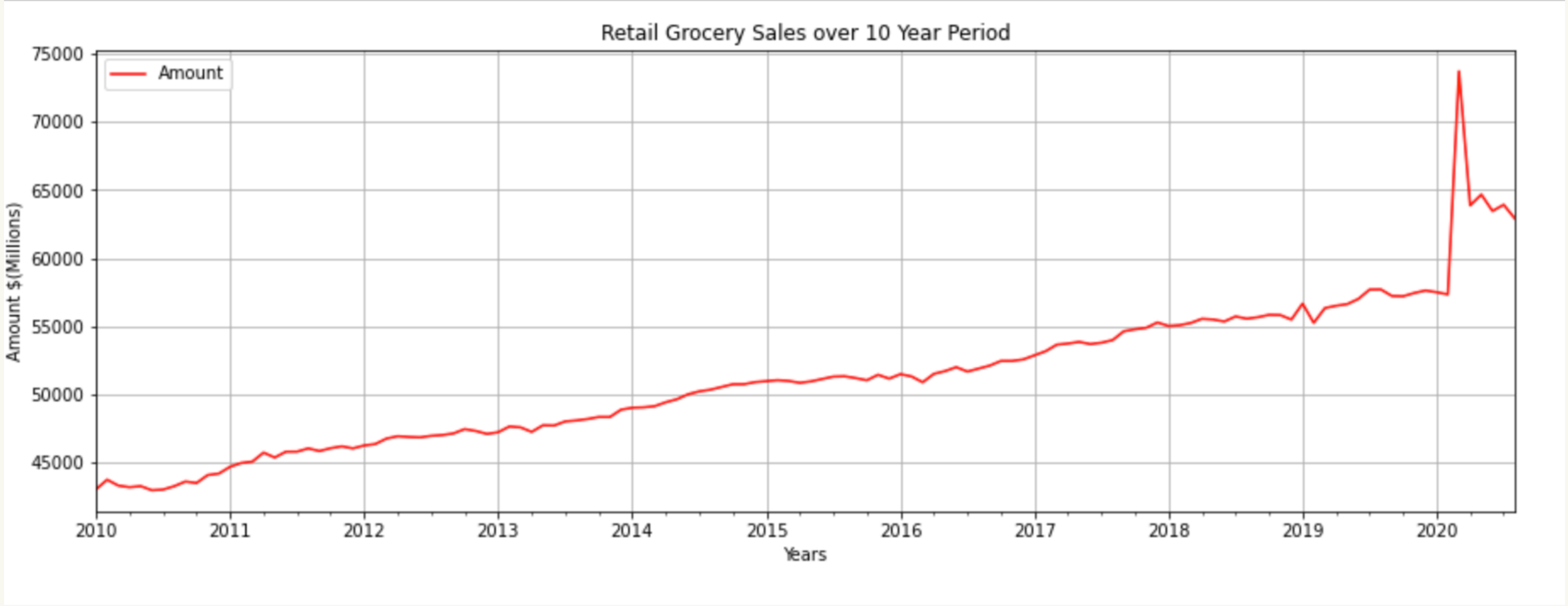
PERCENT CHANGE OF RETAIL SALES

While the figures from January to August of this year are important, that data alone will not give us enough insight on how the epidemic has impacted retail sales. To see how exactly retail sales were affected and to what extent, we compared the numbers of this year to the numbers from 2019, pre-COVID-19. The below graph depicts the percentage change in retail sales for the same months in 2019 and 2020. The food service and beverage sector, which includes restaurants, bars, cafes and the like, sees a sharp decrease in sales at -20.9% change. The food and beverage store sector that contains grocery stores and markets however, sees a 12.2% increase in sales in comparison to the previous year.



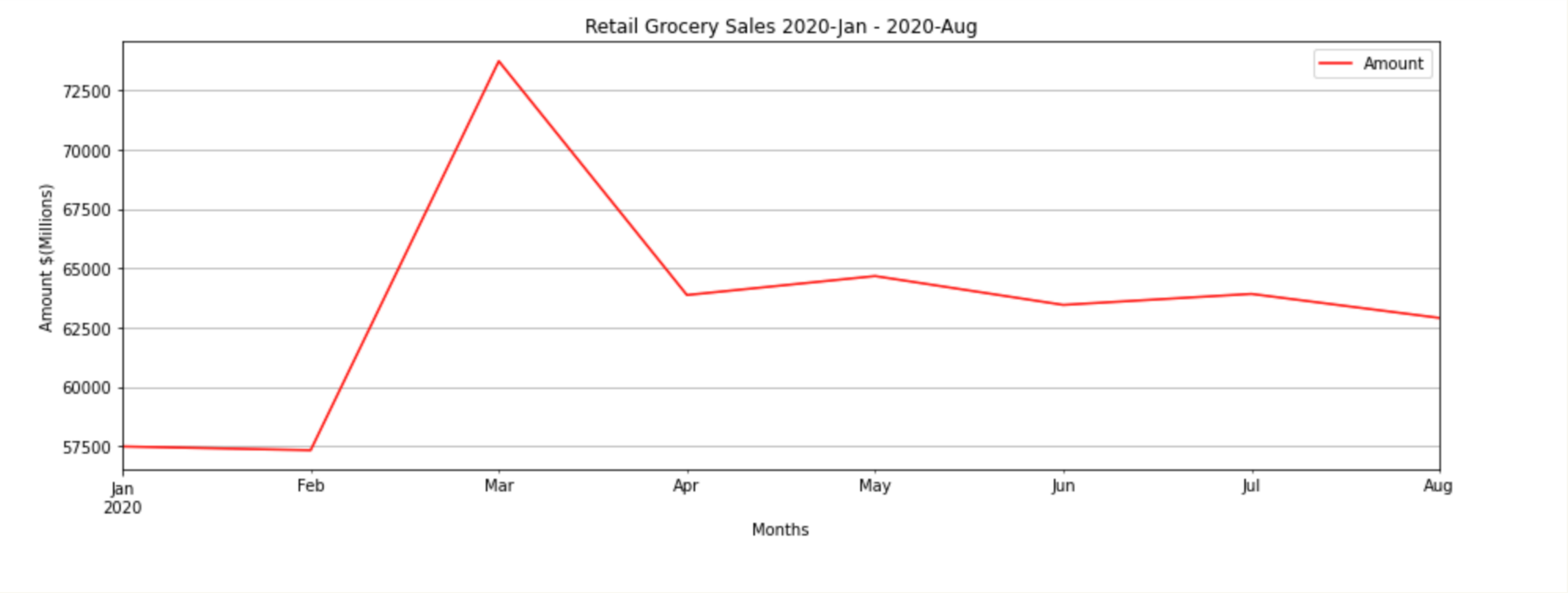
TOTAL RETAIL SALES- LAST 10 YEARS

To answer these questions, we pulled retail sales data from the United States Census government website and cleaned it to show us what the retail grocery sales figures look like within a 10 year period.



TOTAL RETAIL GROCERY SALES- 2020

When taking a closer look at retail grocery sales the year of 2020, we see that sales figures rise in February of 2020, reaching a climax in March and falling sharply by April. There were minor fluctuations after April, but sales have been generally consistent with a slight downward trend. However, the numbers in August are still much higher than what they were when sales spiked in February

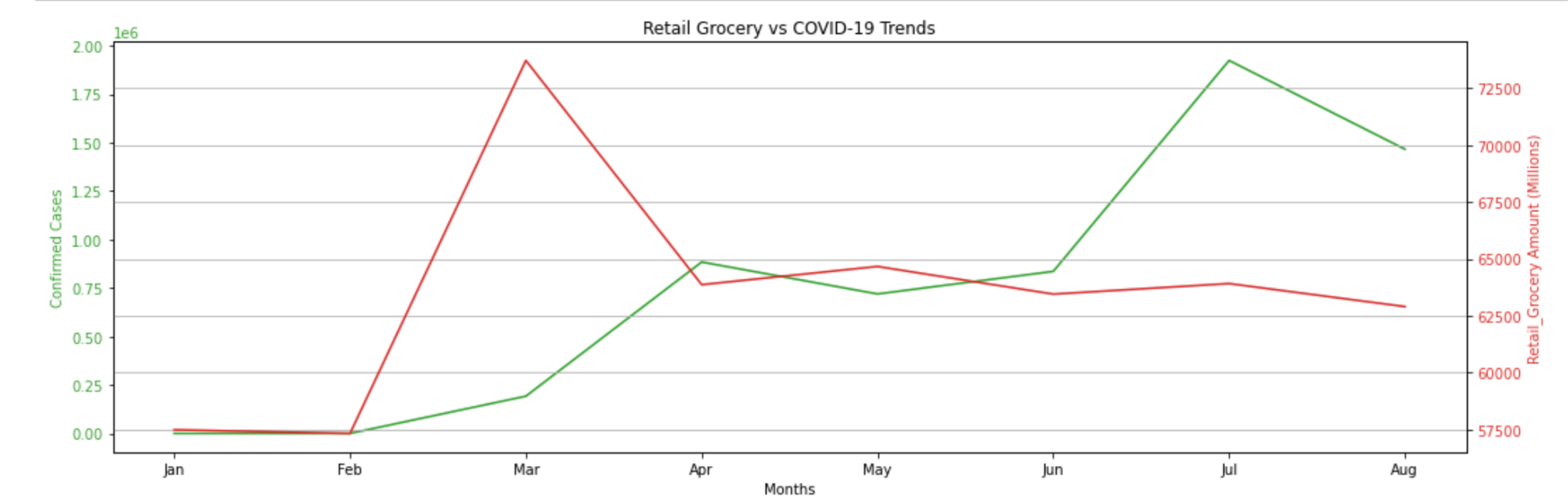


TOTAL RETAIL GROCERY SALES- 2020

This box plot on retail grocery sales indicates that March of 2020 is an outlier month. We believe what we see here is panic buying and stockpiling in March, which reduced in April as many more restrictions were put in place and consumers were less worried about the shortage of grocery essentials in an unexpected pandemic. This also reflects a few main factors related to government stay-at-home orders, including government mandated closures of schools and restaurants, driving a significant percentage of consumer food spending from physically eating out to purchasing food to be eaten at home. After confirming the impact quarantine and COVID-19 had on retail grocery store sales, we wanted to know whether or not there was an association between the number of confirmed coronavirus cases and these grocery sales figures.

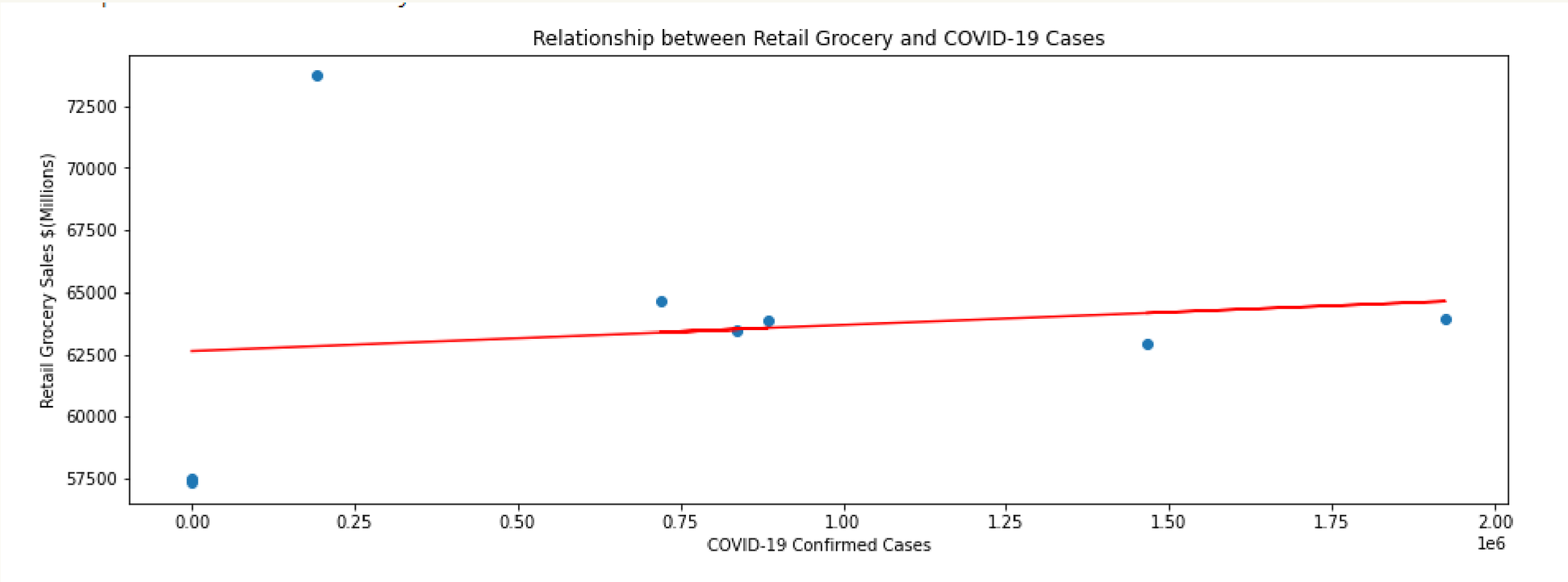
RETAIL GROCERY VS COVID

To do this, we stacked retail grocery sales trends against the number of confirmed cases. The steepness of the rise of grocery sales makes an interesting comparison against the more gradual rise of COVID cases. In March, the two lines have an inverse relationship- showing that although the number of infected individuals was rising at a more rapid rate, there was a decline in retail grocery sales.



STATISTICAL CORRELATION BETWEEN RETAIL GROCERY VS COVID

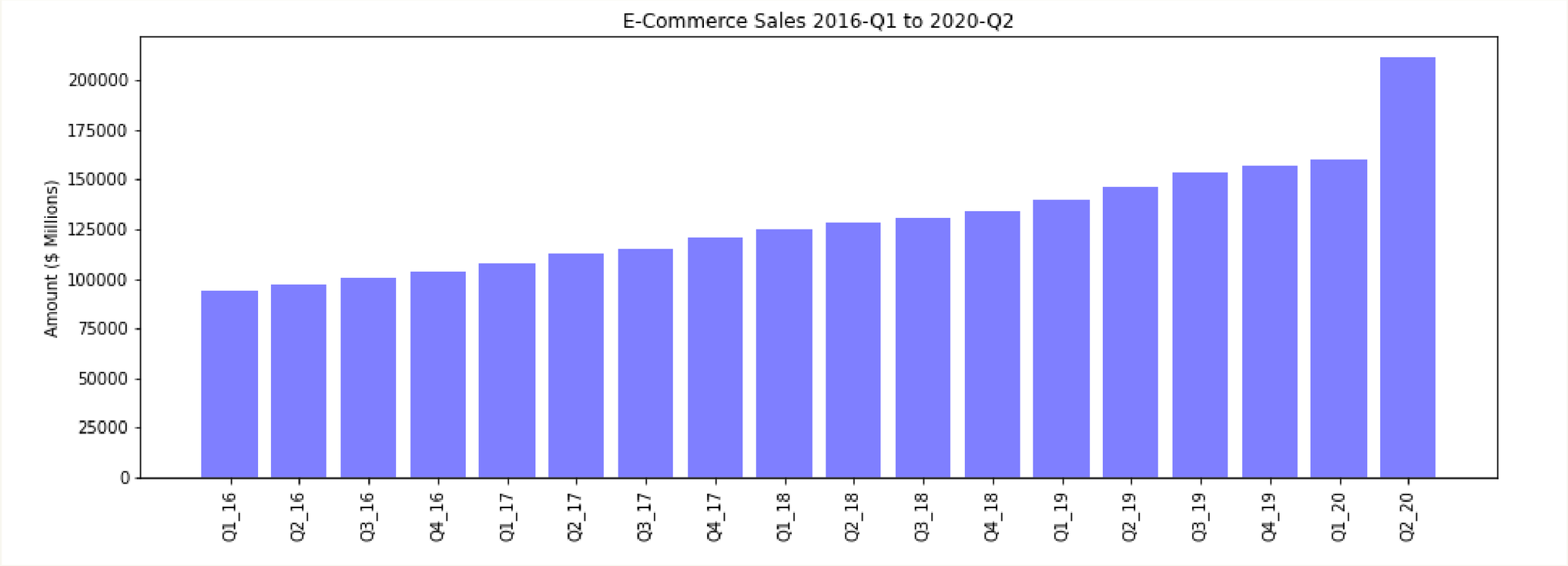
When we first looked at the previous graphs, we thought that there would be some correlation between retail grocery trends and the number of confirmed coronavirus cases. We put this to the test calculating a correlation coefficient. Contrary to what we thought, the two factors have little to no linear correlation at a correlation coefficient of 0.14



We did however want to look more closely at the fall of retail grocery sales during the time period in which confirmed COVID cases were rising. We thought - if people are still buying groceries but not in the conventional method of going into a retail supermarket or grocery store, how are they doing it? This is where we turned to look at the e-commerce sector and the growing market for e-grocery and grocery delivery services.

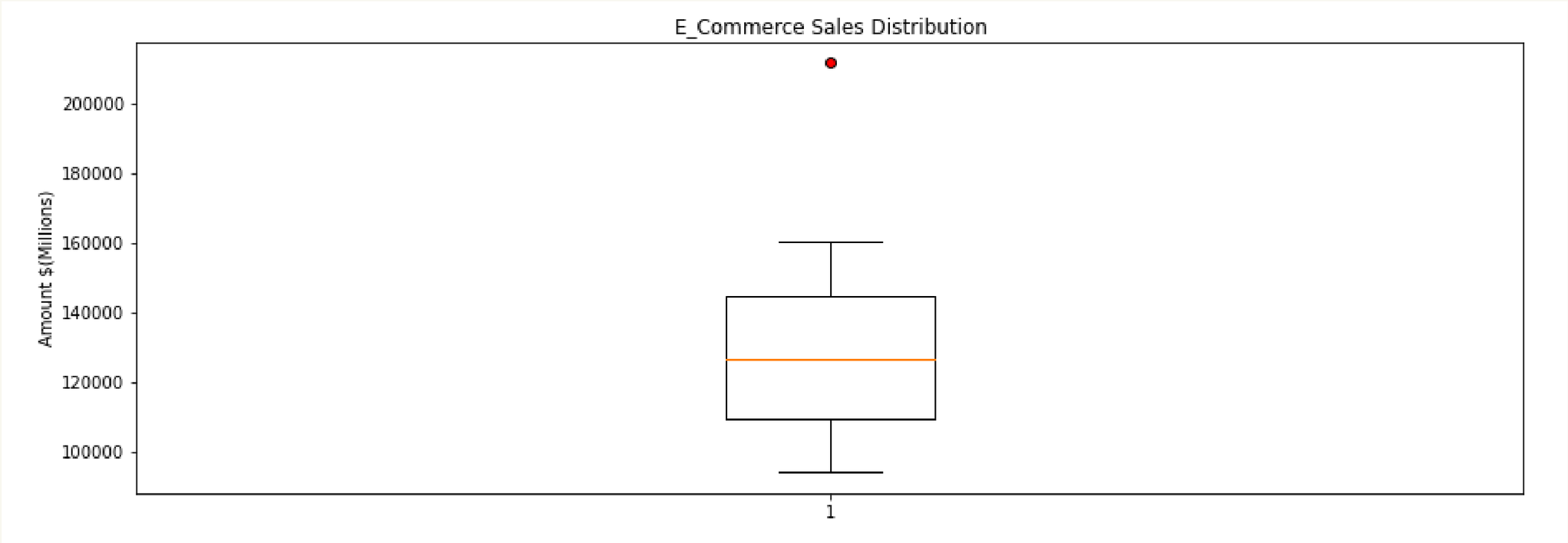
E-COMMERCE SALES FROM 2016 TO 2020

We took a look at how e-commerce as a whole has changed recently. Above bar graph shows e-commerce sales figures from Q1 of 2016 to Q2 of 2020, which is around April to the end of June this year. Between Q1 and Q2 of 2020, there was a 44.5% growth in e-commerce sales.



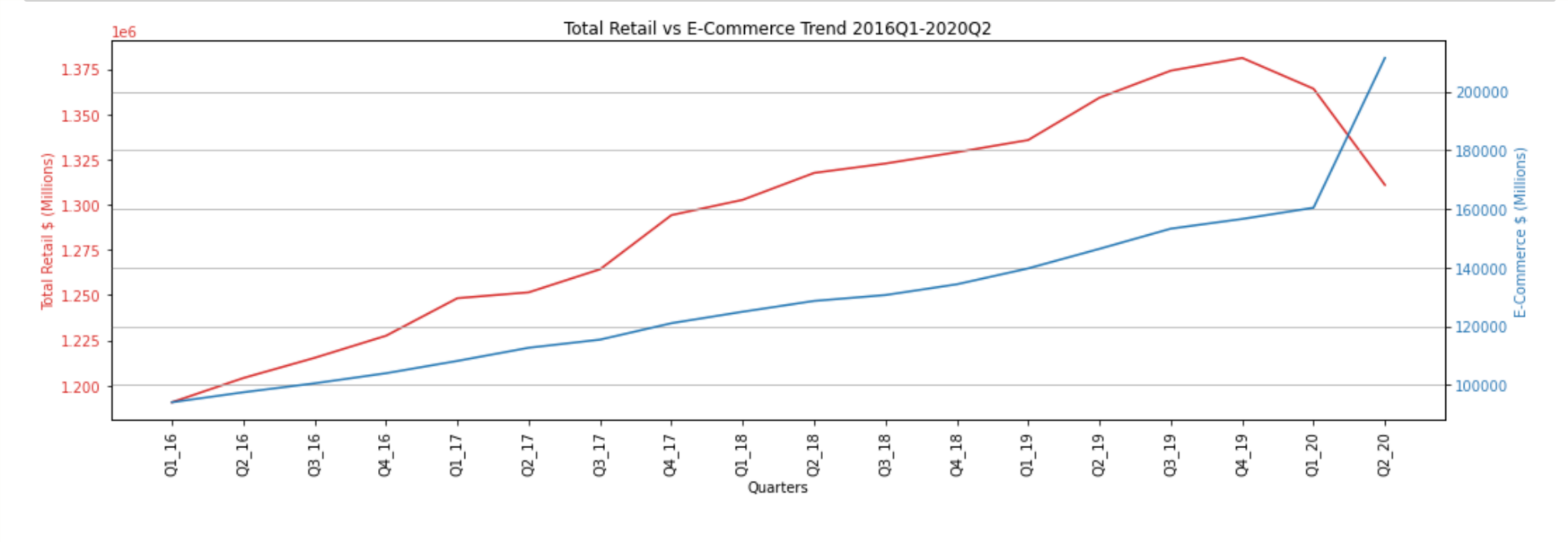
E-COMMERCE OUTLIERS

Here, we see a box plot which shows that there is a clear outlier - Q2 of 2020. We then proceeded to compare total e-commerce sales to total retail sales to see if e-commerce really had become a replacement to retail options.



TOTAL RETAIL VS E-COMMERCE

By taking retail sales data that we analyzed earlier and putting it against e-commerce sales data, we can observe that e-commerce had been steadily increasing through the years but spiked upwards in Q1 of 2020. In the same quarter, we see a sharp decrease in retail sales indicating a change in consumer behavior. This was between the beginning and peak of coronavirus lockdown procedures. Even after the retail stores started to reopen, we continue to see an increase in e-commerce sales while retail sales continue to plummet. Based on this, we can propose that the more specific grocery sale trends will look similar.



STATISTICAL CORRELATION BETWEEN RETAIL VS E-COMMERCE

A Pearson’s correlation coefficient of 0.74 between total retail sales and e-commerce shows that in general, there has been a positive linear correlation between the two variables, up until 2020. However, the single outlier on the right tells us that COVID-19 has forced a huge change in consumer shopping choices.

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The r-squared is: 0.5554214475969071
The equation of the line is: y = 1.56x + 1091493.95
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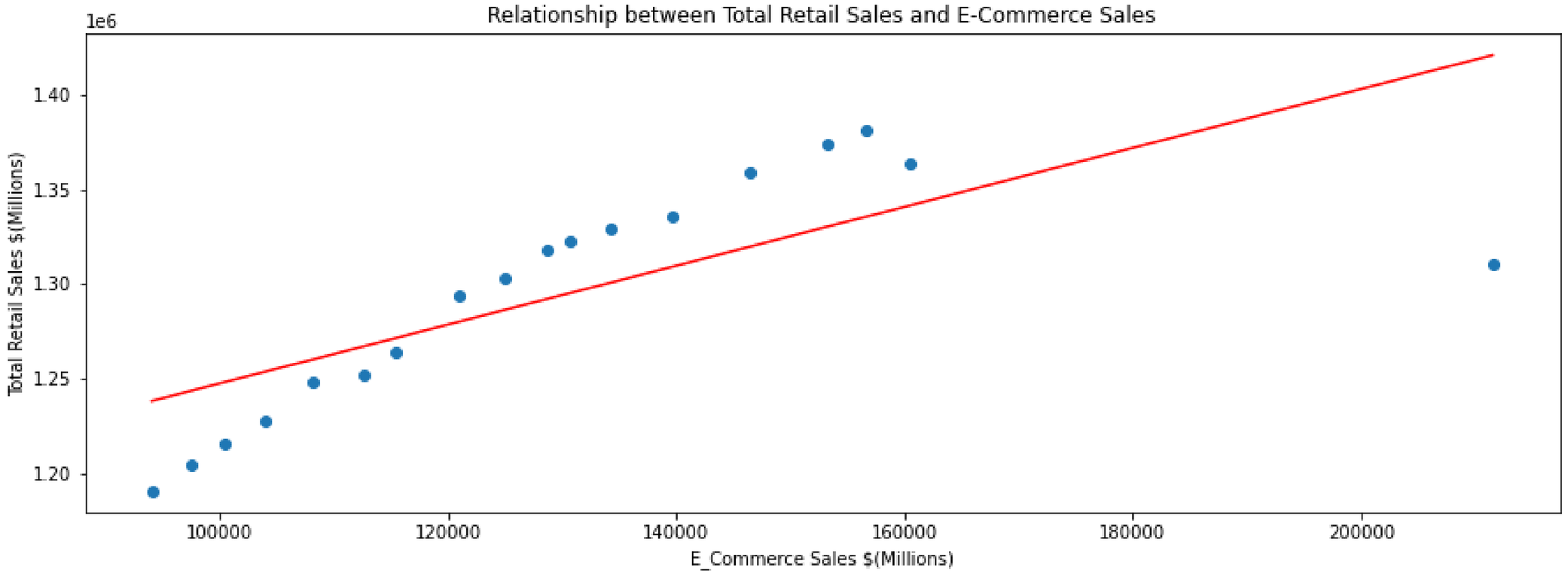
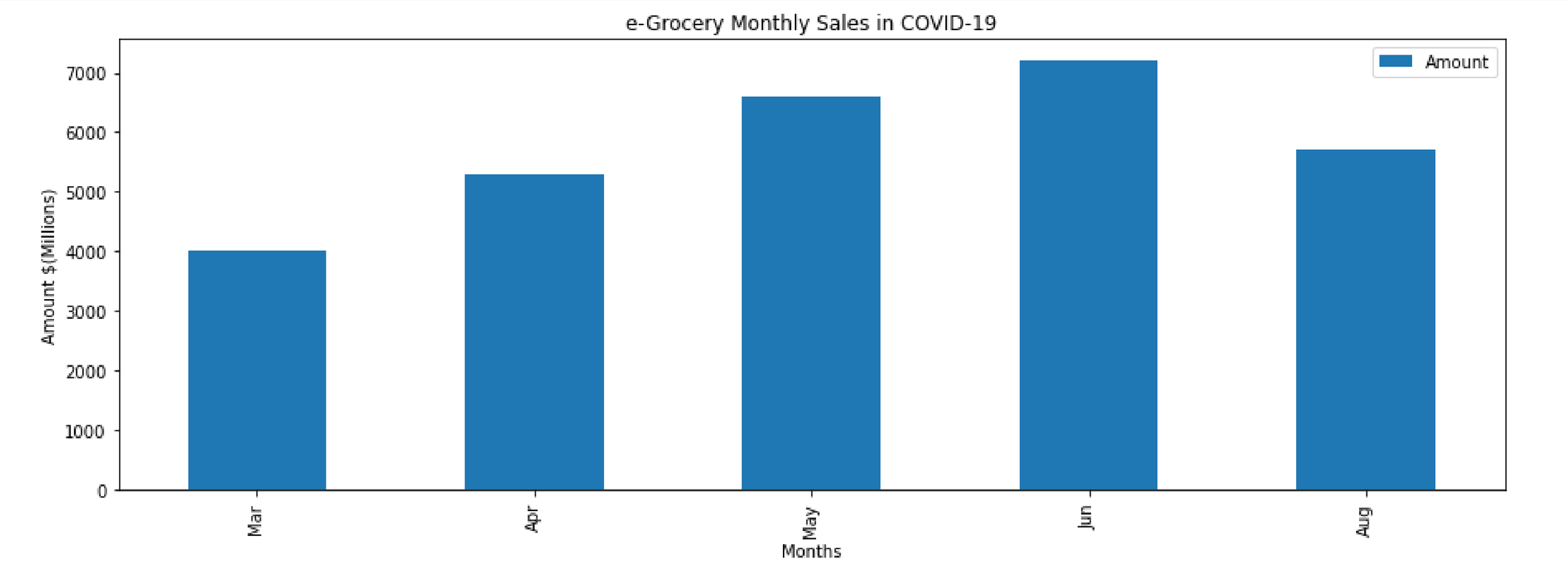


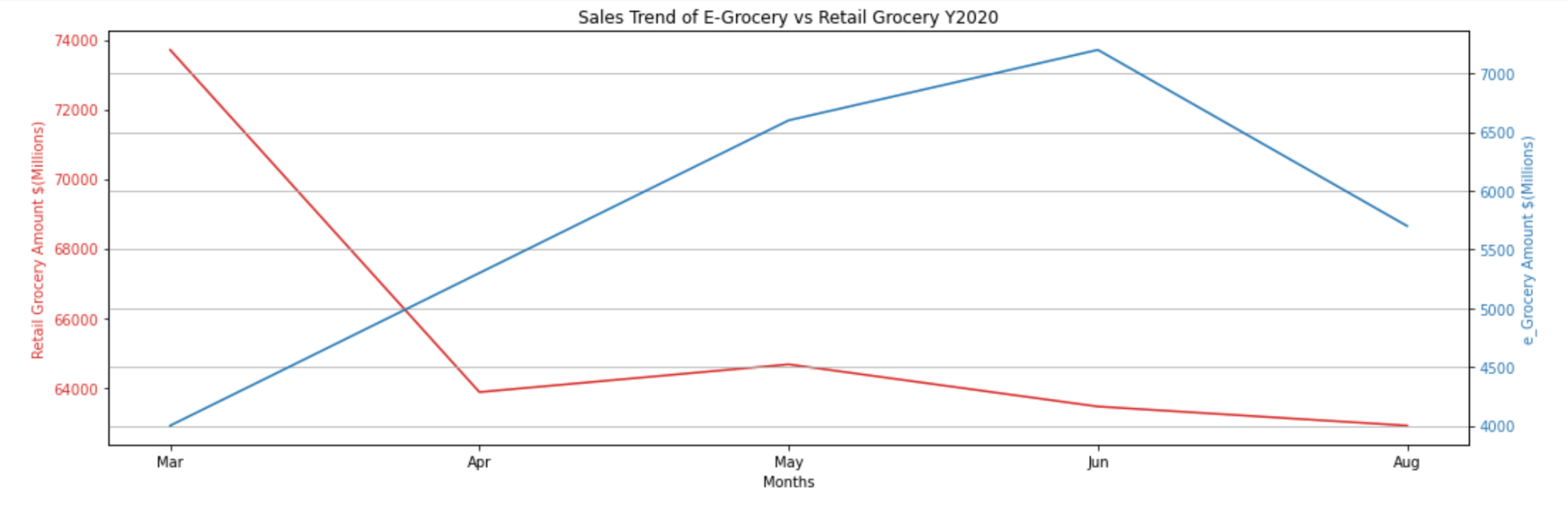
E-GROCERY MONTHLY SALES IN COVID-19

To look at groceries specifically, we created a bar graph for e-grocery monthly sales during COVID times. Unfortunately our data sample was limited, and we were only able to obtain figures for March, April, May, June, and August. The elevated e-grocery sales figures in May and June correspond to the peak in total e-commerce sales from Q1 to Q2 of 2020.



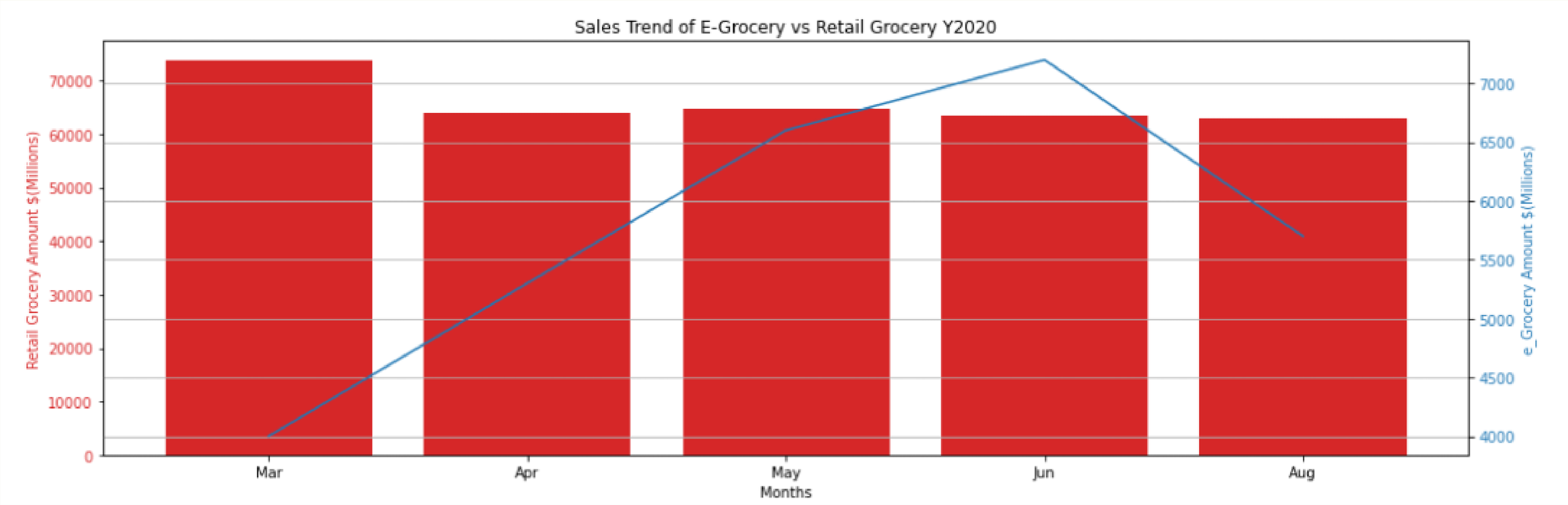
RETAIL GROCERY VS E-GROCERY

This comparison is done between the same corresponding months in each data set due to the limitations of obtaining data for the months of January, February and July. Therefore we dropped the data for those three months in the retail grocery dataset to make a more accurate comparison with e-grocery sale data. A point of intersection between the two lines occurs between March and April of 2020.



RETAIL GROCERY VS E-GROCERY

The pandemic changed consumer behavior and online business furnished. Graph below compares retail grocery sales via E- grocery sales. We can see that since March E-grocery sales increased compared to retail grocery sales. Though from June to August sales dropped significantly, it is still high compared to March sales. The decrease can be attributed to a multitude of factors, such as the question of whether or not e-grocery costs are sustainable for most consumers, and also the reopening of the food service and beverage sector for takeout options. As of August, traditional retail grocery is still not able to recover from the decline in sales.

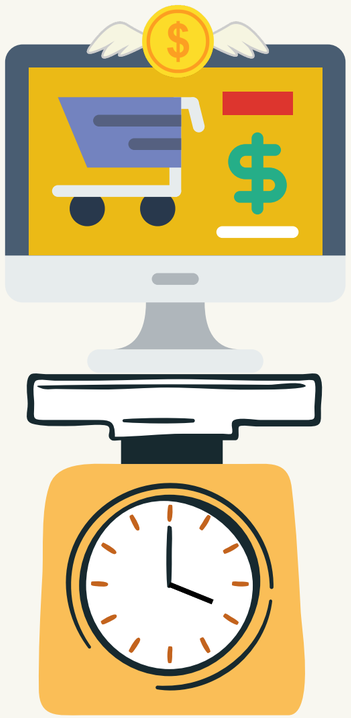


To Conclude...

The numbers provide hard evidence that COVID-19 has drastically changed consumer behavior.

There is no direct linear correlation between retail sales figures in 2020 and the number of confirmed COVID-19 cases. The coronavirus pandemic has no doubt accelerated the speed of the online shopping trend, and most likely forced businesses of all industries to go online and offer contactless, easy-to-access options to stay competitive. But the moderate decrease in sales of e-grocery in the latter half of the year specifically hints that consumers still prefer personally shopping for groceries in store rather than online or through an app.

We believe that as more time passes and consumers transition to post-COVID times, there will again be a positive linear correlation between retail sales and e-commerce sales, as it has been historically. There is no doubt however that recent advancements in e-commerce and e-grocery will blend technology with our daily lives even more, hopefully increasing ease of access and making our lives more convenient. Since it has only been 9 months since the beginning of the COVID-19 global pandemic, the data that is available is still limited. We believe that after more time, we can be even more precise with our analysis and prediction.



Thank you!