Introduction

In this report, we will be exploring the effects of lockdown and other government interventions on OmniCorp during the ongoing COVID-19 virus outbreak. Since our operations are primarily in Europe, and North, Central and South America, with stakes mainly in the retail and hospitality sectors, this is where we will be placing our focus. We present our findings and recommendations in the following.

A summary of our findings is as follows:

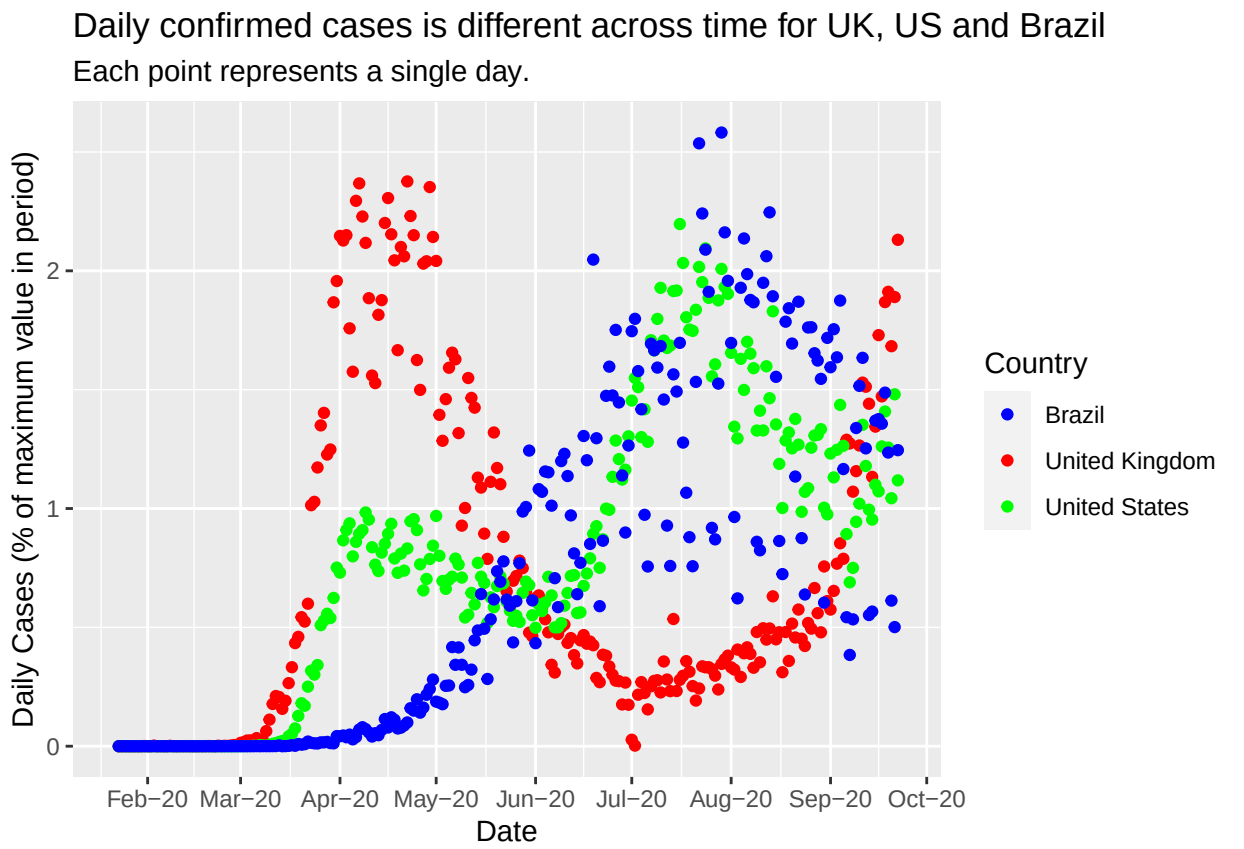
- The number of confirmed cases impacts the severity of lockdown and government interventions imposed.
- As lockdown measures are enforced and people stay at home more, people travel into work less. This then effects the number of visits to physical stores.
- Lockdown decreased significantly physical retail and recreational activity, leading to ecommerce boom.

Analysis

Confirmed cases

The first immediate effect of lockdown is with the number of confirmed cases of the COVID-19 virus. At the start of the pandemic, the infection rate of the virus was relatively high and thus the number of confirmed cases was rising at an exponential rate. Governments around the world started imposing lockdown measures and restrictions in attempt to slow down the rate of infection and consequently the number of confirmed cases within populations. However, these restrictions brought with them huge changes to society in a very short period of time. These changes have both direct and indirect consequences to OmniCorp.

The main reason for lockdown is to reduce the spread of the virus. However, the types of restrictions, effectiveness of lockdown and adherence and enforcement of rules has varied significantly between countries. The effect of lockdown on confirmed cases is important for OmniCorp in order to be able to plan for potential future restrictions. The following graph shows the relative number of daily confirmed cases to the maximum number of confirmed cases for the United Kingdom, United States and Brazil. We will use the tidycovid19 dataset, downloaded from the tidycovid19 R package on 24th September 2020. Descriptions of the different variables found in the data relating to the current epidemic and further details of the package can be found at this website (Gassen 2020).



As we can see from the graph above, the three countries' number of confirmed cases is very different throughout the period. There are many possible explanations for this; first case time, geographical composition of land, population density, and most importantly, the types of lockdown the governments imposed. Although the distribution of confirmed cases looks very different for each country, they all have a "first wave" where the number of daily cases rises to a high point then begins to fall. This would potentially indicate that lockdown and government interventions have an inverse relationship with the number of confirmed cases, that is, as restrictions are imposed, the number of cases decreases. This would make sense as many restrictions are stopping the movement and contact of people, reducing the spread of the virus.

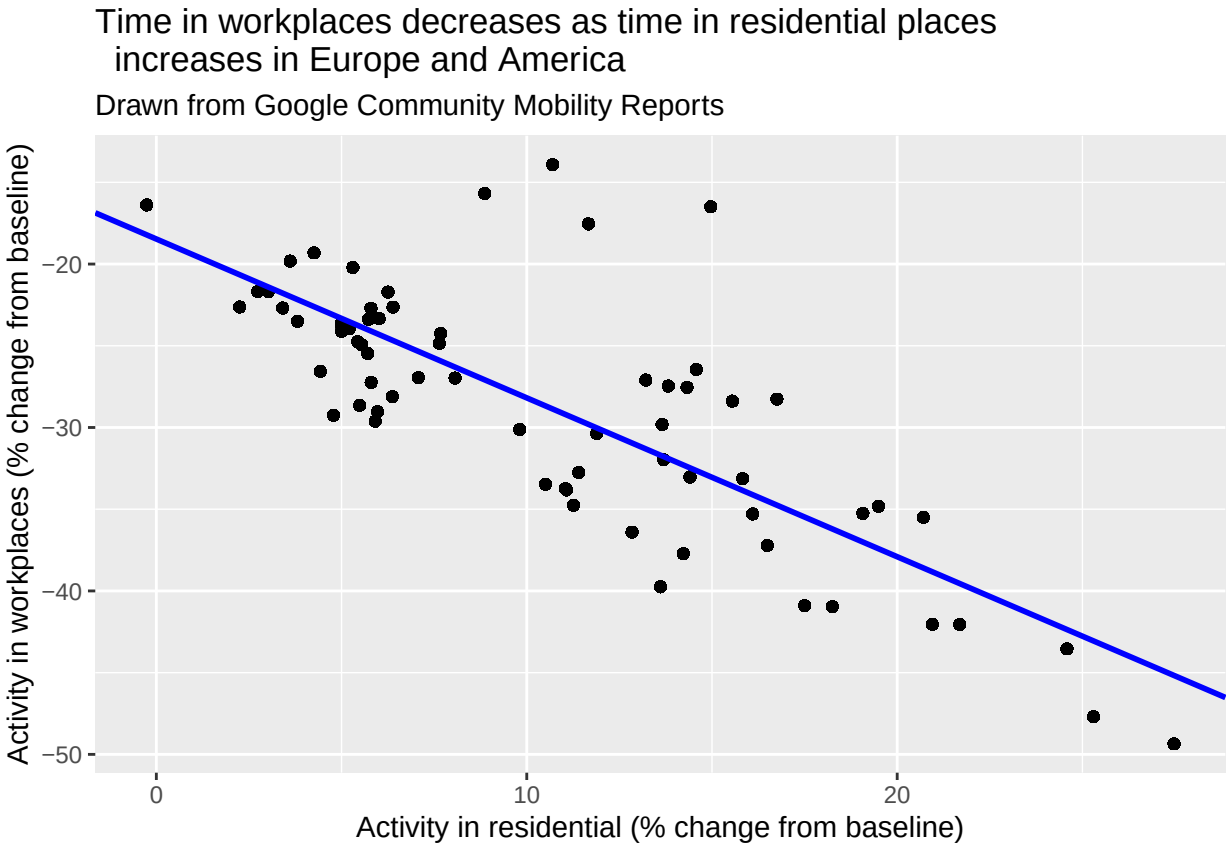
The number of confirmed cases has many effects on OmniCorp, both directly and indirectly. The direct effects concern the staff, supply chain and customer base. OmniCorp Staff, as well as supply chain staff, may be affected by illness and self-isolation, meaning they cannot work. This will impact the everyday running of operations. High levels of unemployment may also mean customers do not have as much disposable income to spend in OmniCorp businesses, potentially seeing to a reduction in revenues. An indirect effect is the implementation of lockdown and government interventions which in turn, may change consumer habits and behaviors. A key aspect of lockdown is restricting the movement of people. We will investigate the changes in these movement habits and how they will effect OmniCorp in more detail below.

Activity in residential places and workplaces

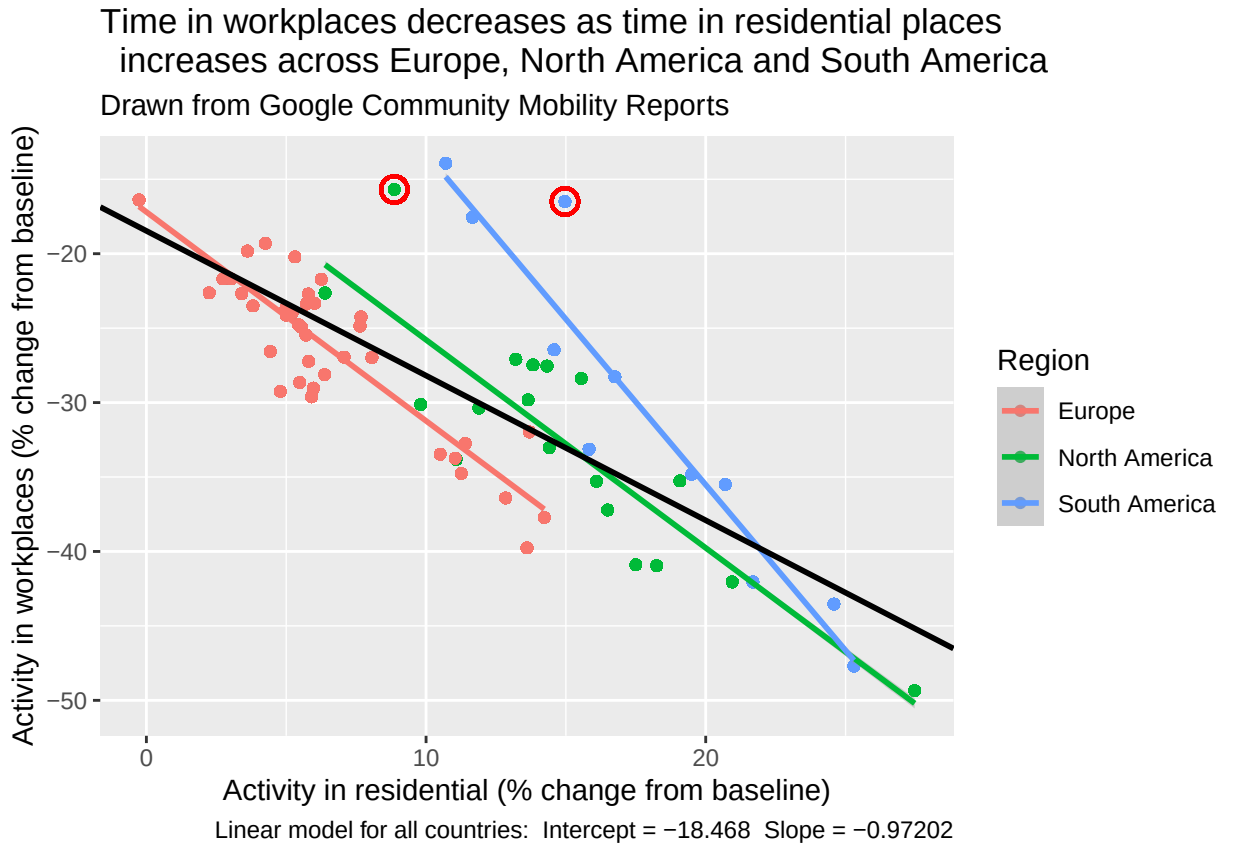
We will now look at how the frequency of people visiting residential and workplaces has changed during the pandemic for countries in Europe and North, Central and South America. In particular, we use the same tidycovid 19 dataset as above, and study the `gcmr_residential` and `gcmr_workplaces` variables that have been taken from a community mobility report (Google, 2020). The variables are expressed as a percentage*100 change relative to the baseline period from Jan 3 to Feb 6, 2020. However, we take the data from Feb 7, as we want to look at the average percentage change in the frequency of people's visits to these places, without including the baseline in this mean. We find the mean of these variables and name them

`mean_gcmr_residential` and `mean_gcmr_workplaces` respectively.

We plot the average percentage change in the frequency of visits to residential places against workplaces for countries in Europe and America from this year (Feb 7 onwards). We look particularly at the trends for Europe, North America and South America. Note that we are including the Central America countries with North America. We fit a linear model between these variables and see that a linear relationship fits fairly well.



We now separate the plot into the different regions to see if the relationships of the variables differ between the regions. We fit a linear model between `mean_gcmr_workplaces` and `mean_gcmr_residential` for all countries in Europe and America, and plot this linear relationship on the graph, as well as the individual linear trends for each region.



We can see from this plot that the general trend is as the time spent in workplaces decreases, the time spent in residential places increases. We see that when looking at each region in isolation, a linear relationship is a fairly good model, and reflects the general trend of all countries. The linear relationship between time in residential places and time in workplaces is arguably stronger when looking at regions individually, with the strongest linear relationship in the South American countries. In fact, the linear model for South America is a very good fit.

We also note that there was a greater overall average activity in residential places in South America than in Europe. However, this could be explained by the time period. We are looking at data from Feb 7 - Sept 20, and in this time period South America is predominantly in Autumn and Winter, in which people tend to stay at home more than in Spring and Summer, so there is potential for misleading data. Given more time and data, it would be interesting to explore the structure of the economies for each of the countries as this could give more indication to why the trends appear to be different for each continent.

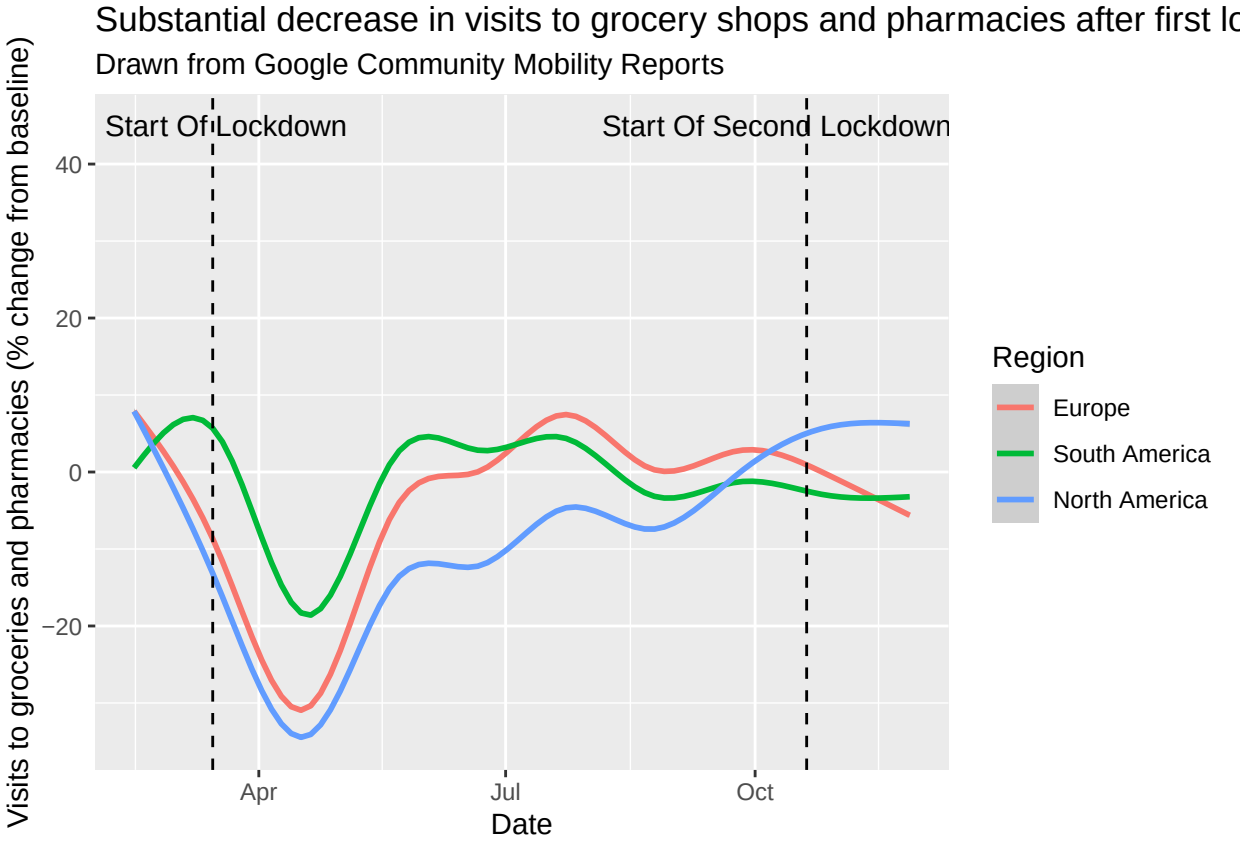
We look closer at the outliers in the trends for North & South America and identify that these are Nicaragua & Paraguay, respectively. A possible explanation for these countries could be due to their very low rates of infection and number of confirmed cases. This may have had an effect on the level and type of lockdown that was imposed in these countries. This could indicate to OmniCorp that these countries could transition back to normal operations quicker than other countries post lockdown.

Activity in grocery and retail

Next, we will investigate consumer habits and how they changed throughout the pandemic. To have a broader view of the impact of lockdown on the retail and hospitality sectors, we need to examine the more fundamental parts of consumer's habits. In 1943, Psychologist Abraham Maslow introduced the Maslow Hierarchy of Needs. This model suggests that people need to fulfill basic needs before they can move on to more advanced ones such as psychological needs or self-fulfillment needs. Hence, we first start by investigating

people's visits to grocery shops and pharmacies. Although this sector isn't directly connected to retail and hospitality, the principles are the same - they sell goods to consumers directly. To understand the mobility trend of people going outside and buying non-essential, retail products, we need to first understand their mobility trend of going to a grocery shop or pharmacy.

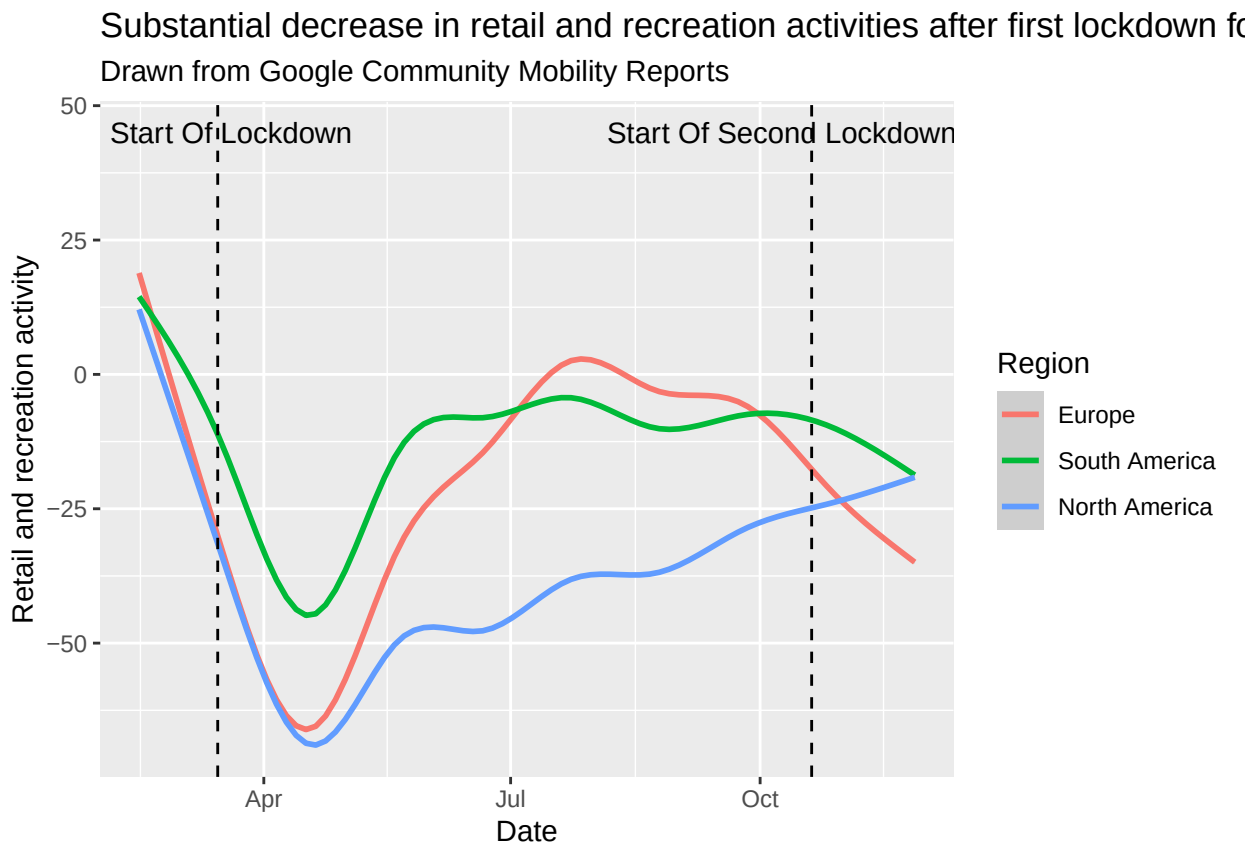
Below is a graph depicting the average percentage change in the frequency of people's visits to grocery stores and pharmacies, relative to a baseline period from Jan 3 to Feb 6, 2020 of the three regions OmniCorp is operating in. In the majority of countries throughout the regions we are looking at, lockdown restrictions were imposed during the period starting March-April and second lockdowns during October-November. Hence, the first and second vertical lines are the median dates of all dates of enforement. Note that North and South America did not have second lockdowns.



As was expected, after the enforcement of lockdown measures, visits to grocery shops and pharmacies have decreased significantly, dropping as much as 35% in North America. For Europe and South America we see a fast recovery, whilst North America had a much slow recovery, relatively.

This lead to a decrease in the number of confirmed cases in Europe. In South America however, we see a gradual decrease since mid July. There have been no lockdowns in these countries since the first initial lockdowns. After nearly 8 months of consumer activity having a negative change relative to the baseline, North America recovers in October, and sees a constant increase. To summarize, we can conclude that people during the pandemic have reduced their visits to grocery and pharmacy shops.

We now go on to explore retail and recreation activity during the pandemic. Below you will see the average percentage change in the frequency of people's visits to retail and recreation, relative to a baseline period from Jan 3 to Feb 6, 2020, starting from the 15th of February.



The decrease in activity to retail and recreation is much worse compared to the decrease to grocery shops and pharmacies. Europe and North America had decreased their activity as much as 65-70% in April, although there is a viable explanation to such a drop. In the majority of these countries, the lockdown restrictions forced non-essential stores to close and recreational activities such as sports centers and entertainment centers to also close.

Although Europe and South America have recovered significantly faster than North America after their initial decrease, both regions remained decreased compared to the baseline period throughout the whole period from February until November, with Europe only having half a month of increased activity compared to February. North America on the other hand did not recover as fast as the other 2 regions, but it made consistent progress throughout the whole period.

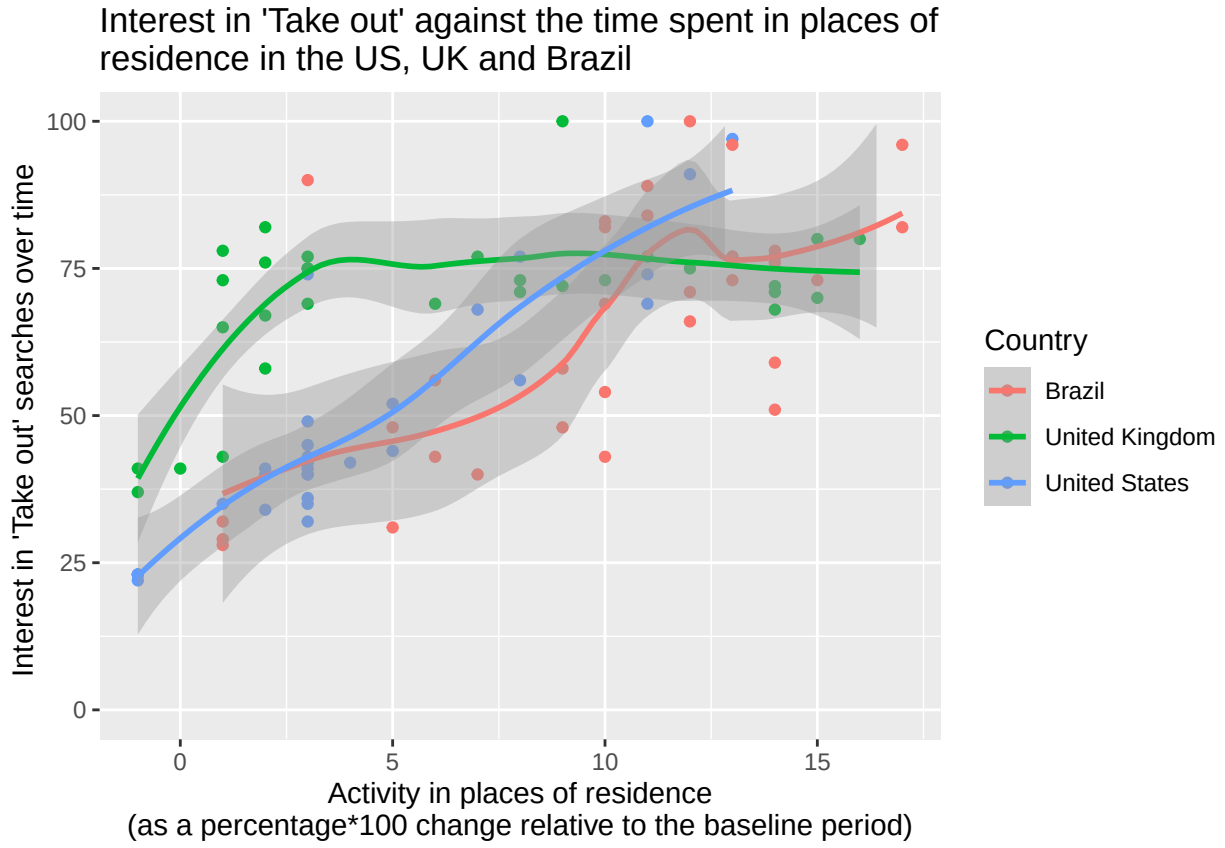
Because of the sharp decrease in people visiting retail shops, ecommerce has accelerated as a consequence.. To further emphasize, Thanksgiving Day spending rose by nearly 22% year over year to $5.1 billion, hitting a new record, according to Adobe Analytics data.

Although we cannot say that the pandemic has changed the way people purchase non-essential items permanently, a survey conducted in October in North America and Canada has showed that 42% of the people are very likely to shop online, compared to the 29% in May (page 11). As shown in this article, online retail purchases in the US have been growing steadily throughout the past years. We recommend OmniCorp investing in research and development in digital marketing, as consumers in the coming years will start moving more onto online spending.

Activity in residential places and interest in 'Take out'

Using Google Trends data (Google Trends, 2020) on the search volume for various terms, we can investigate general interest over time. Google Trends is an unbiased sample of Google search data. It's anonymised, categorized and aggregated. For the regions we are looking at - Europe, North, Central and South America -

the percentage of population that uses the internet is 88%, 95%, 61% and 72% respectively. This indicates that the search patterns shown by Google Trends may be an accurate representation of the behaviors and interests of consumers in these regions.



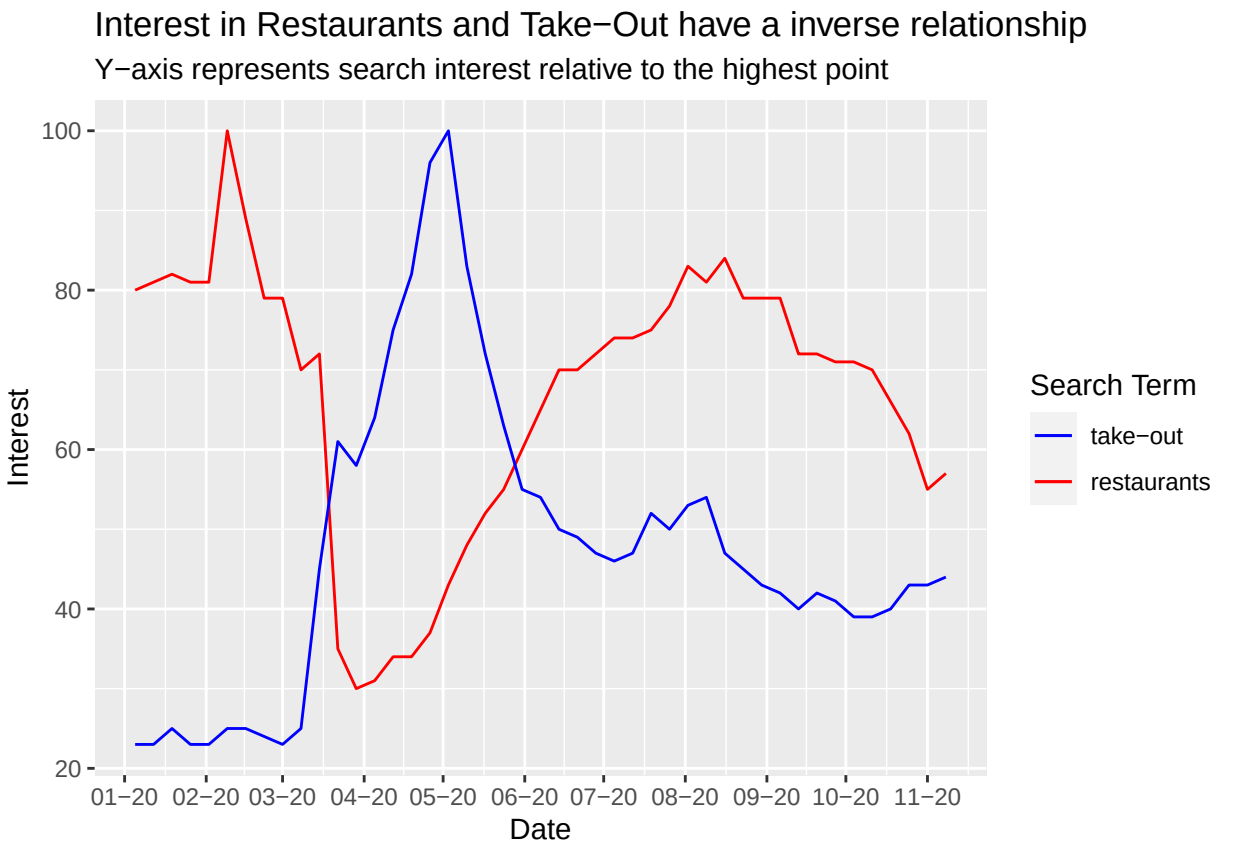
The United Kingdom implemented at least 1 lockdown measure in late March when the daily confirmed cases of COVID-19 was on the rise. Due to this, we have seen an increase in the activity in places of residence before hitting its peak in late April. We can see due to COVID-19 the interest in 'Take out' remained consistent throughout the lifetime of the pandemic. This could indicate further interest in purchasing food to eat at home. OmniCorp should facilitate this demand for "Take out" by offering food delivery services for their restaurant outlets in the United Kingdom.

Similar to the UK, the government of Brazil implemented at least 1 lockdown measure in late March. This suppressed spread of COVID-19 until July when the daily confirmed cases was on the rise. As the number of confirmed cases increased the activity in places of residence followed. We can also observe an increase in the interest for "Take out".

Despite the U.S. government having 0 lockdown measures in place we have seen an increase of activity in the places of residence. At the first peak of the daily confirmed cases of COVID-19 in April, we can see that the citizens in the U.S. were cautious and the activity within residences peaked, as seen by the increase in activity in places of residents above. Due to the increased activity in residences, we have noticed a positive relationship between the activity in residences and the interest in 'Take out' searches in Google trends.

To capture the loss of business in the hospitality sector, mainly restaurants, We recommend OmniCorp to expand into delivery of food from their current hospitality businesses. This will hopefully recover the business that is lost due to COVID-19 whilst keeping the spread of COVID-19 to a minimum as customers will be eating at home. This is further supported by the following graph, showing the interest of the search terms `restaurants` and `take-out`. We will plot a graph of the average interest for these terms throughout European, North, Central and South American countries. The y axis represents search interest relative to the

highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular.



The plot above shows that the two search terms' interests have an inverse relationship. As we can see, when lockdown and restrictions began to be imposed by governments, consumer interest in `restaurants` decreased whereas interest in `take-out` increased at a similar but opposite magnitude. This could further suggest that in lockdowns, consumers are looking to buy more food online, possibly due to sit-in restaurants being closed or people scared to go out in public. This indicates that OmniCorp should focus on online retail and hospitality when lockdown measures are introduced. It is also important to note that the interest in `restaurants` increased back to normal levels almost as fast as it fell. However, it had a smaller, more steady decrease as a second wave of restrictions took place whereas `takeout` did not have a similar magnitude of increase. This may show that take-out food is not a direct substitute for a restaurant food and hence it would not be appropriate for a complete change in online only business operations but rather a steady transition into increase online activity and presence.

However, it is important to note that the Google Trends data does not include the nominal number of searches for each term. This means we can only comment on the relative change of each search term individually. We are also assuming that search trends represent the trends of consumer behaviors. As stated above, each region has different internet usage figures. This means that the trends data may only be effective for specific demographics, for example, people under 50 years old.

Conclusion

It is clear that the lockdown and government interventions in response to the COVID-19 outbreak have had effects on the retail and hospitality sectors, as well as society as a whole. Consumer habits and attitudes have been changed in a small period of time. Lockdowns generally helped slow the rate of infection within populations and reduce the impact to communities. However, it brought with it drastic changes; people

stayed at home more, and travelled into work less. This decreased the activity in physical stores and as shown in the food industry in particular, people have turned to using the internet to shop for goods and services. This indicates a shift towards e-commerce and online activities. It is hard to tell if this was an already on-going process in which the COVID-19 outbreak, and subsequent government interventions, helped accelerate. With more time and data, we could identify if people's expenditure in physical shops remained the same and individual's just spent more when they were able to visit, or whether business' income was heavily hit due to the decreasy in activity in stores. Either way, it was clear that there was a significant increase in the use of internet for purchasing goods and services when restrictions were in place. Therefore, it is very important for OmniCorp to be aware of this change and it is strongly recommended that we dedicate resources to developing and sustaining a strong online presence.

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