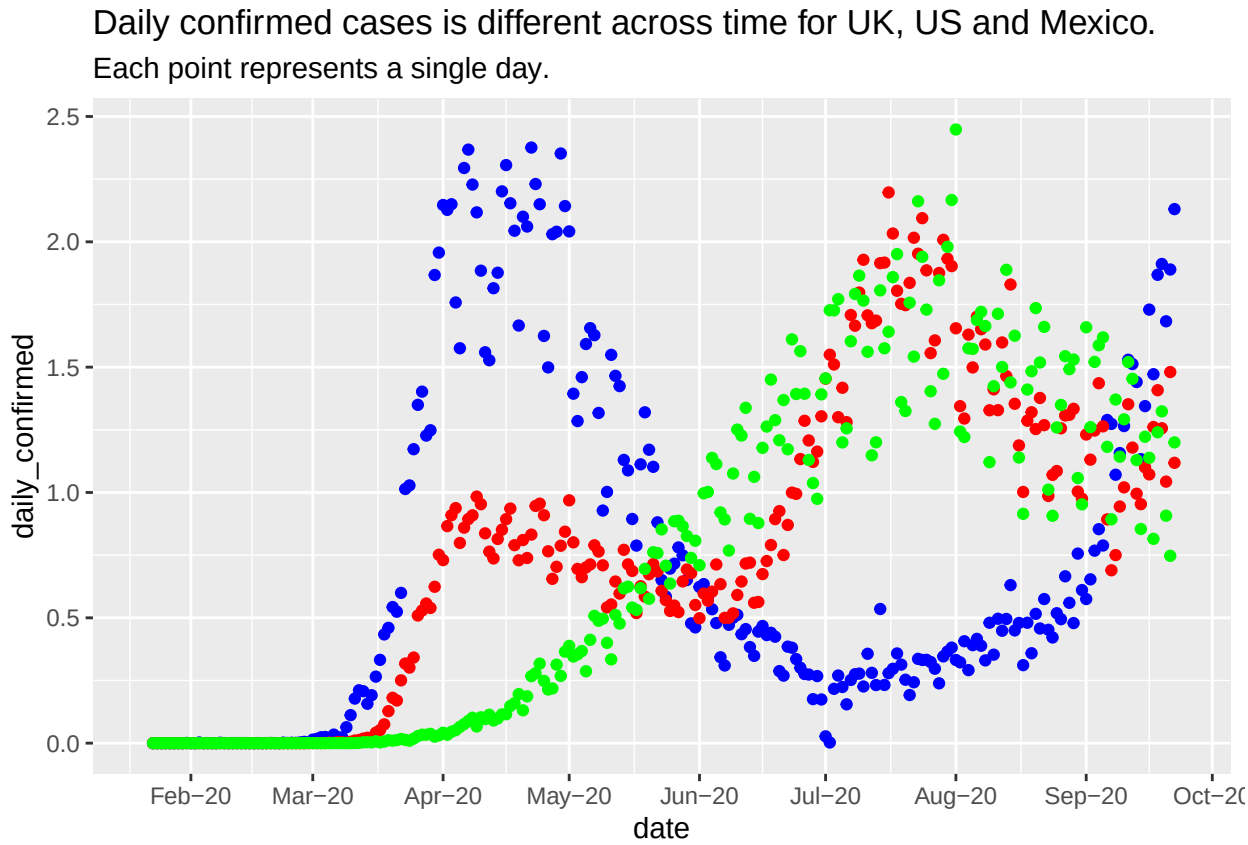
Introduction

In this report, we will be exploring the effects of lockdown and other government restrictions and how they affect OmniCorp. OmniCorp is a large multi-national commercial company with stakes in the retail and hospitality sectors. Their operations are primarily in Europe, and North, Central and South America. We have been tasked with building an in house expertise on the ongoing COVID-19 virus outbreak. This report is our findings and recommendation for the company.

Analysis

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 and restrictions in attempts 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 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 number of daily confirmed cases for the United Kingdom, United States and Mexico. Note that the curves for each country differs. 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).



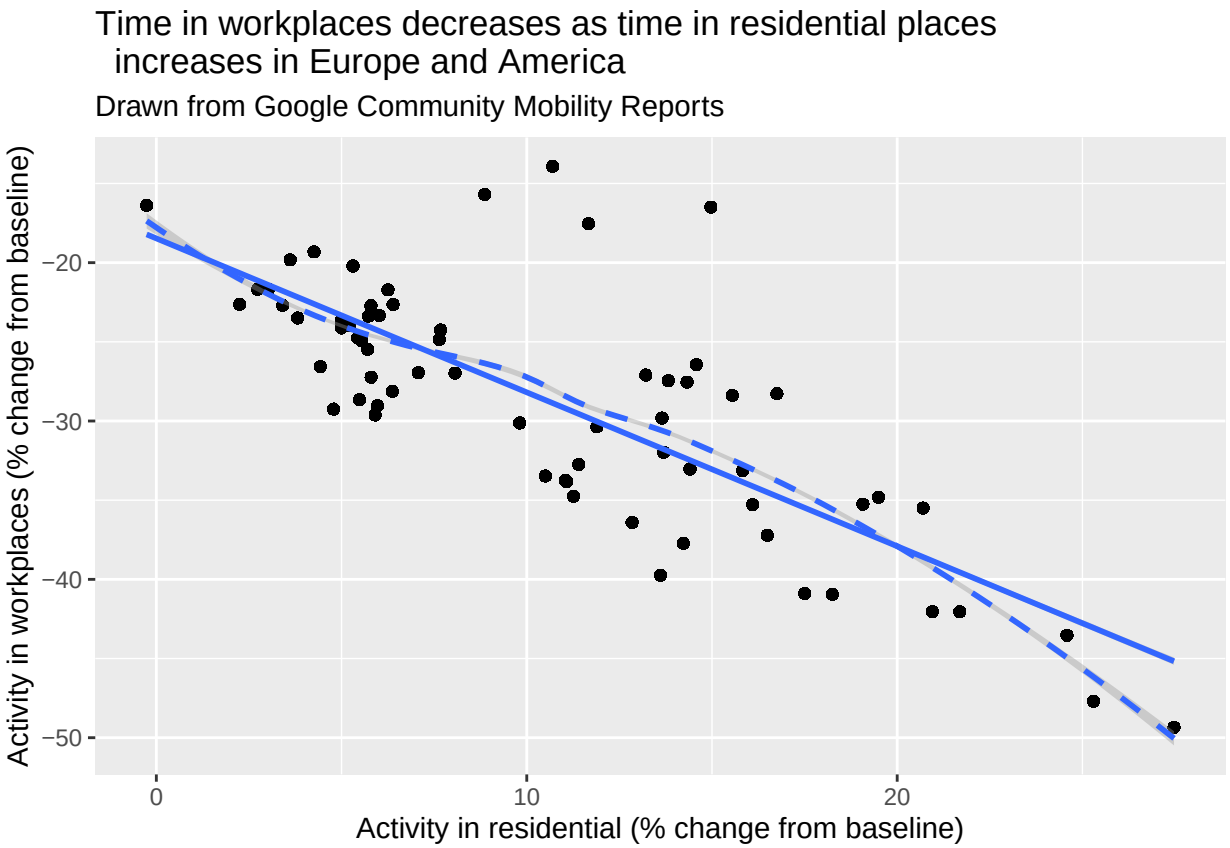
As we can see from the graph above, the three countries number of confirmed cases is very different

throughout the period. There are many explanations for this: first case time, geographical composition of land, and most importantly the types of lockdown the governments imposed. Although the distribution of confirmed cases looks very different for each country, they all seem to 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 restriction seems to have a 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 between people, reducing the spread of the virus.

The number of confirmed cases has many effects on OmniCorp, directly and indirectly. One of the direct effects is that the staff, supply chain and customer base are all impacted by the virus and may be changed. An indirect change is the implementation of lock and restrictions which in turn, may change consumer habits and behaviors. A key aspect of lockdown is restricting the movement of people. We will investigate the change in these movement habits.

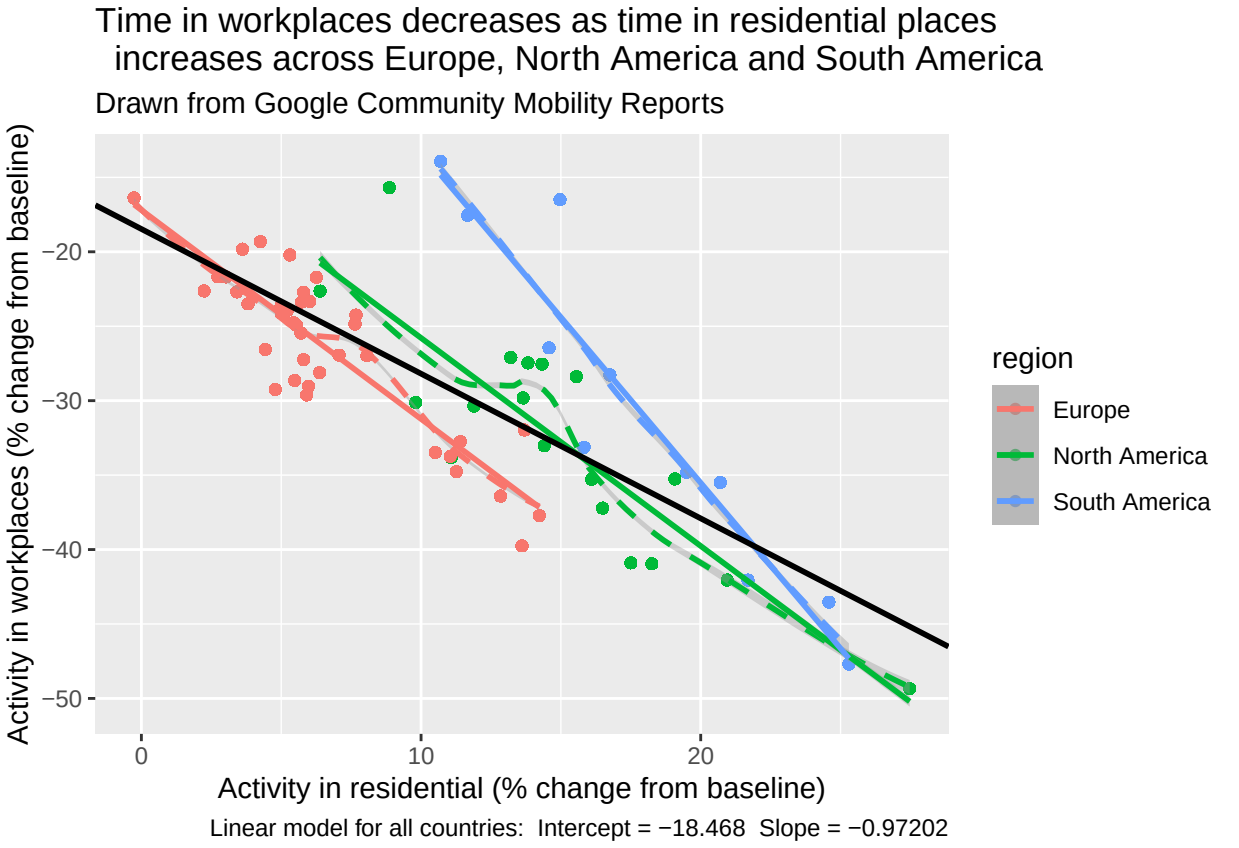
We look at how the frequency of people visiting residential places and workplaces has changed during the pandemic for countries in Europe and the Americas. In particular, we study the `gcmr_residential` and `gcmr_workplaces` variables from a community mobility report (Google, 2020). The variables are expressed as a percentage*100 change relative to the baseline period Jan 3 - 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, and don't want to include 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. We fit a linear model as well as the best line of fit and see that a linear relationship between the variables 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 also 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.

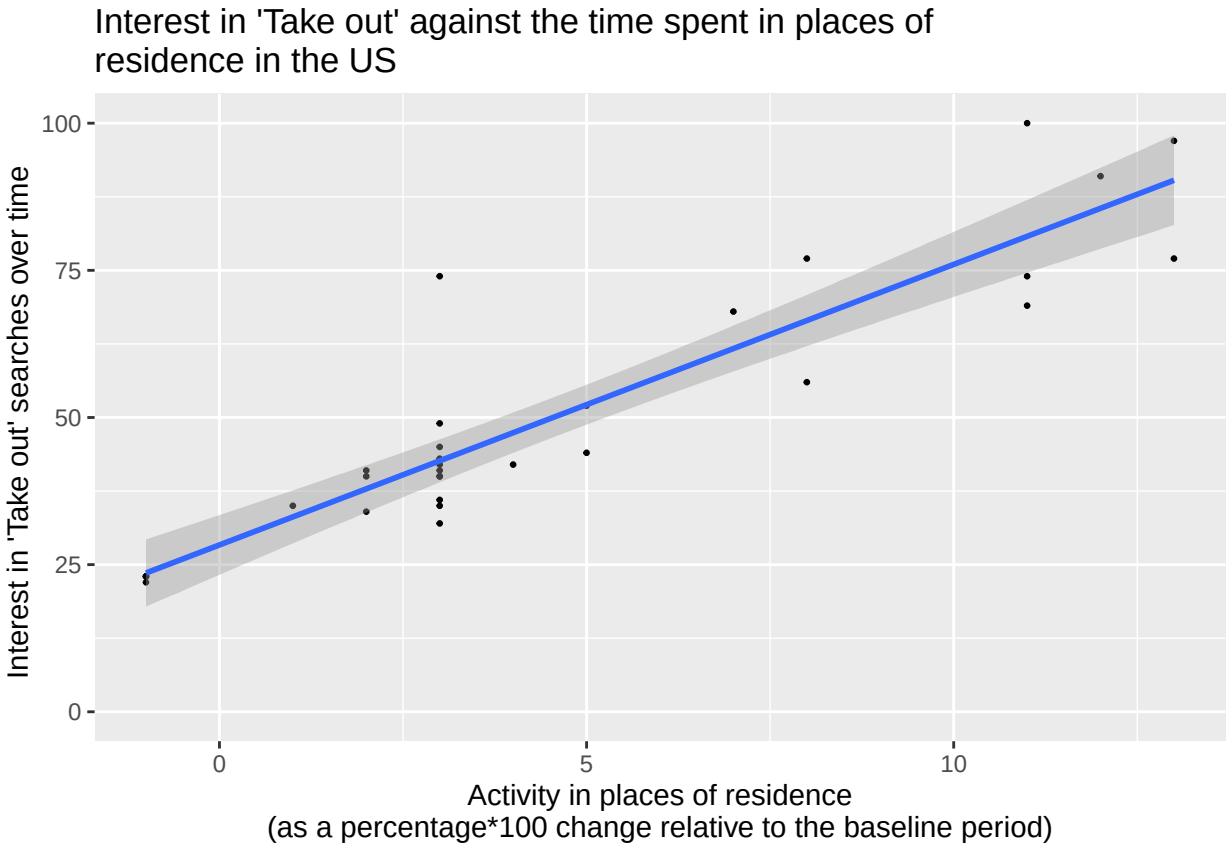


We see from this plot that the general trend is as the time spent in workplaces decreases, the time spent in residential places increases. We see that when looking at each region in isolation, a linear relationship is a fairly good model, and reflects the general trend of all countries. The linear relationship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

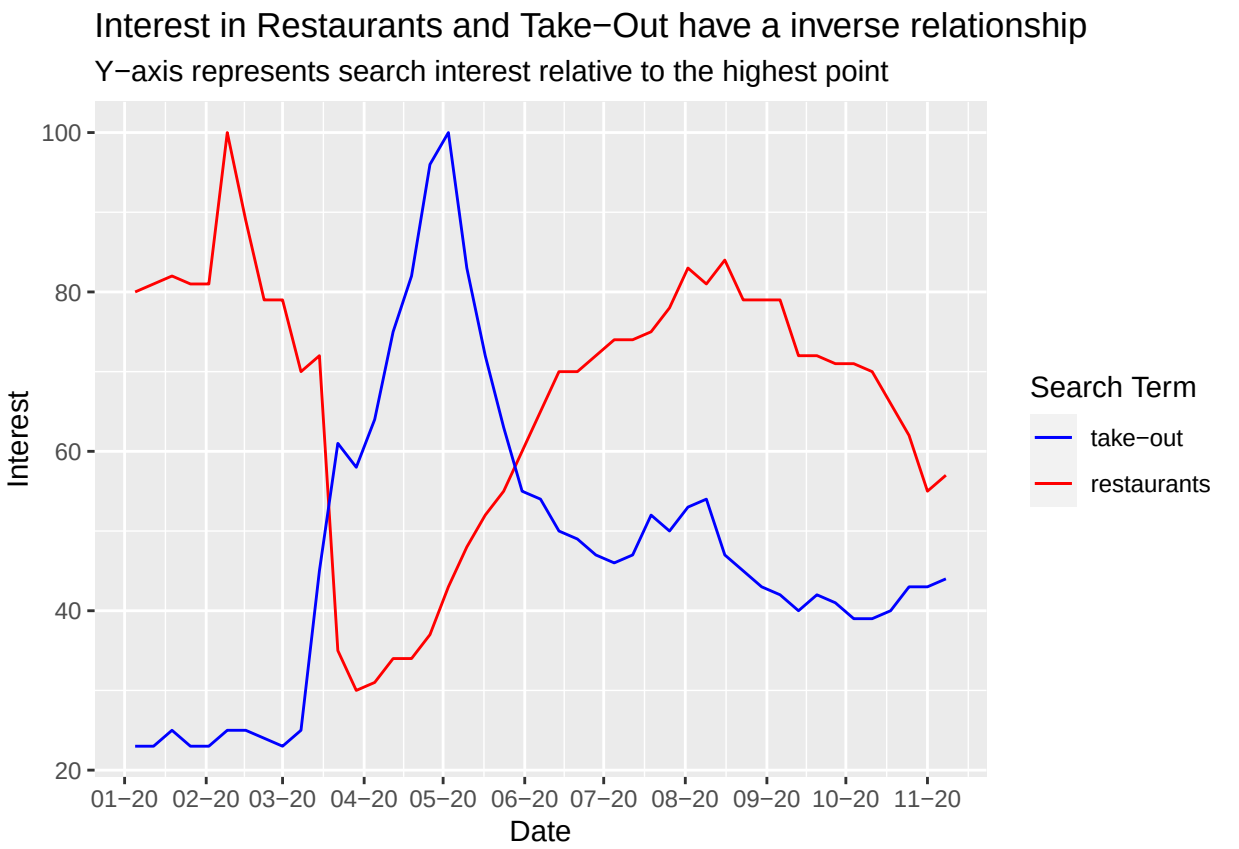
We look closer at the relationship of activity in residential places against activity in workplaces for Europe, North America and South America individually, to identify any outliers in the trend and identify why these might occur. We select the same 6 countries as in our first section and plot these along with the linear trend for all countries in the region. We also plot a dashed linear trend which shows how the linear model changes when it is fit with just the six countries selected.

Using Google Trends data on the search volume for various terms, we can investigate the 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 these regions.



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 (refer to the graph of the Daily Confirmed Cases of COVID-19 as a % of the total population) around April we can see that the citizens in the U.S. were cautious and the activity within residences peaked (refer to the gcmr_residence against date plot). 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 restaurants. 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' interest 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 magnitude. This shows 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 we, 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.

Conclusion

It is clear that the lockdown and restrictions in response to the COVID-19 have had effects on the retail and hospitality sectors, as well as society as a whole...

- Acceleration of change to online?