Residential and Workplace

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Introduction & data

Since the large impacts of the pandemic on OmniCorp, particularly in the retail and hospitality sectors, we are interested in the effects of lockdown and other government interventions and how/why these might be different in different countries.

In the following, we will use the dataset "tidycovid19.csv", 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).

We look at how the frequency of people visiting residential places and workplaces has changed during the pandemic for countries in Europe and America. In particular, we study the `gcmr_residential 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.

Activity in residential places and workplaces in Europe and America

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.

Time in workplaces decreases as time in residential places increases in Europe and America

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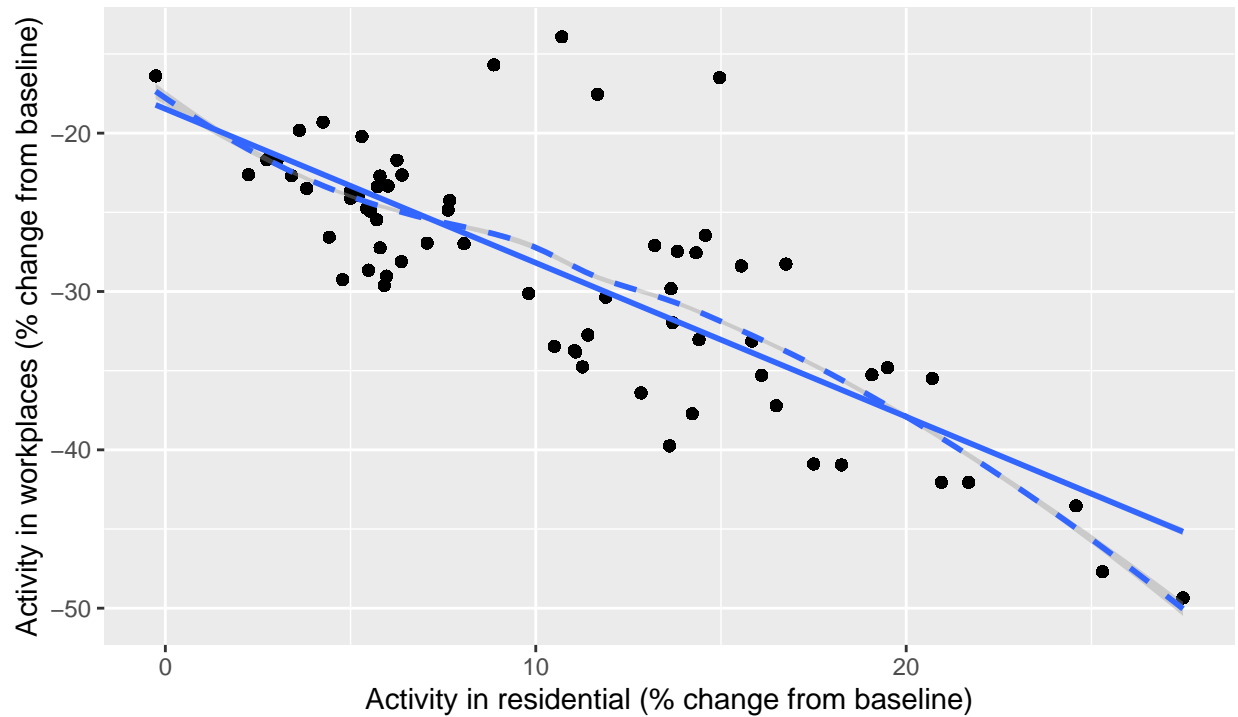
We now separate the plot into the different regions to see if the relationships of the variables differ between the regions. We also fit a linear model between `mean_gcmr_workplaces` and `mean_gcmr_residential` for all countries in Europe and America and plot this linear relationship on the graph, as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

Time in workplaces decreases as time in residential places increases across Europe, North America and South America

Drawn from Google Community Mobility Reports

Linear model for all countries: Intercept = −18.468 Slope = −0.97202
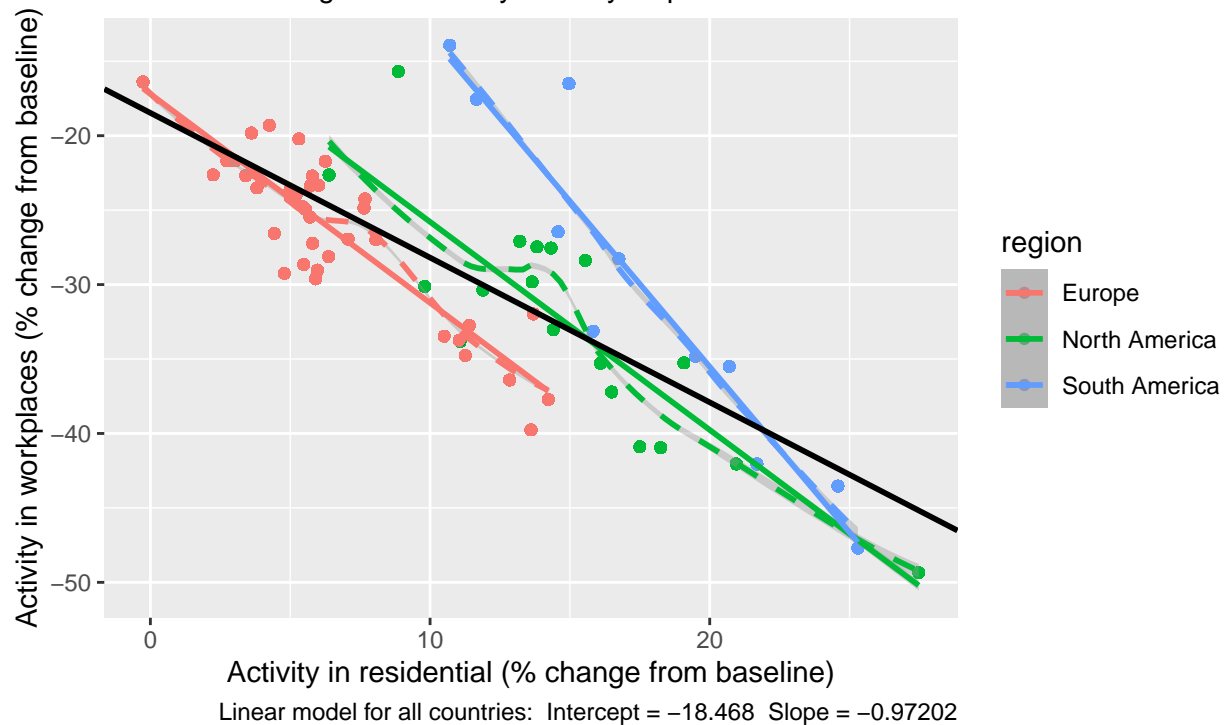
We see from this plot that the general trend is as the time spent in workplaces decreases, the time spent in residential places increases. We see that when looking at each region in isolation, a linear relationship is a fairly good model, and reflects the general trend of all countries. The linear relationship 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.

Time in workplaces decreases as time in residential places increases across Europe
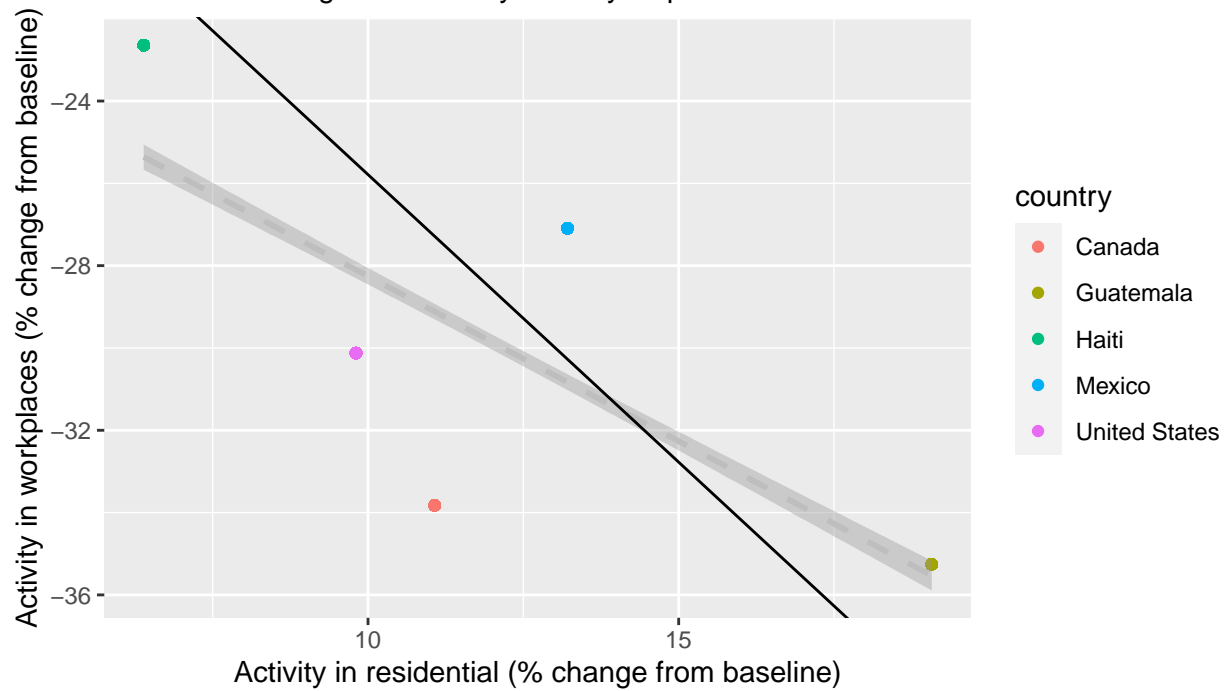
Drawn from Google Community Mobility Reports
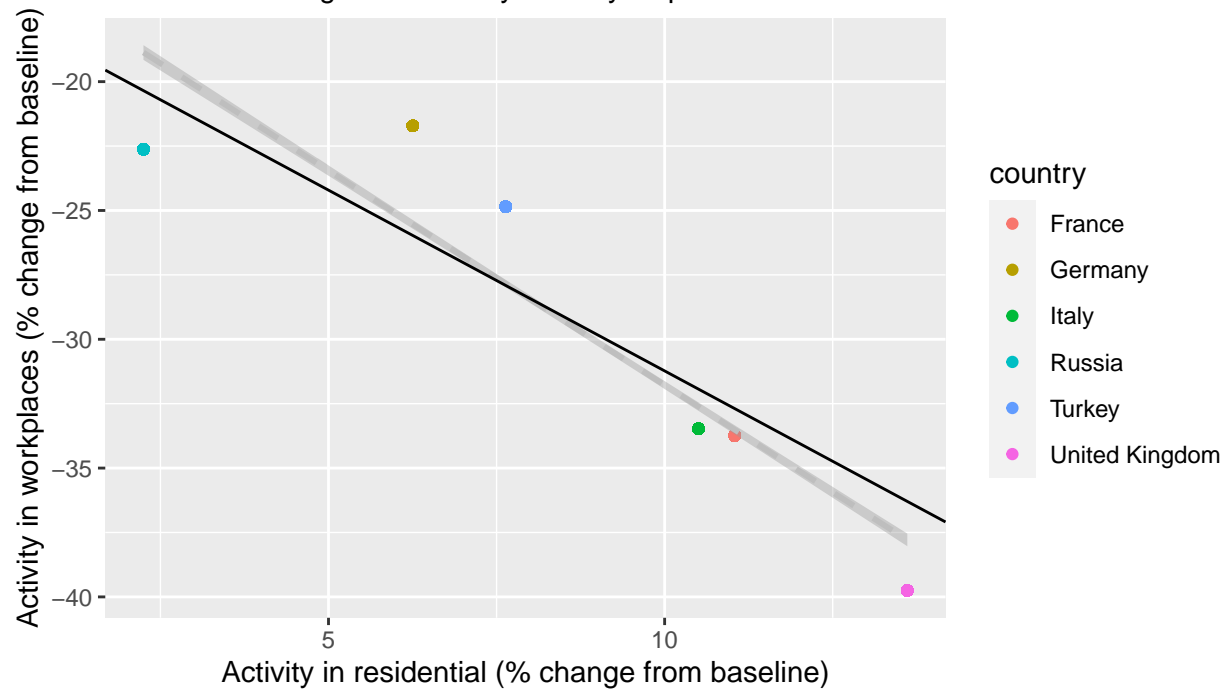
Linear model for all countries in Europe: Intercept = −17.195 Slope = −1.4033

Time in workplaces decreases as time in residential places increases across North America

Drawn from Google Community Mobility Reports

Linear model for all countries in NA: Intercept = −11.812 Slope = −1.3975

By reducing to just six countries we see that the linear model changes a fair bit, and shows that there isn't as strong decrease in time spent in workplaces as the time spent at home increases. This might be due to the fact that Canada and United States are left in this sample, and they did not choose to enforce as strong lockdown measures as some other countries.

Time in workplaces decreases as time in residential places increases across South America

Drawn from Google Community Mobility Reports

Linear model for all countries in SA: Intercept = 8.981 Slope = −2.2251
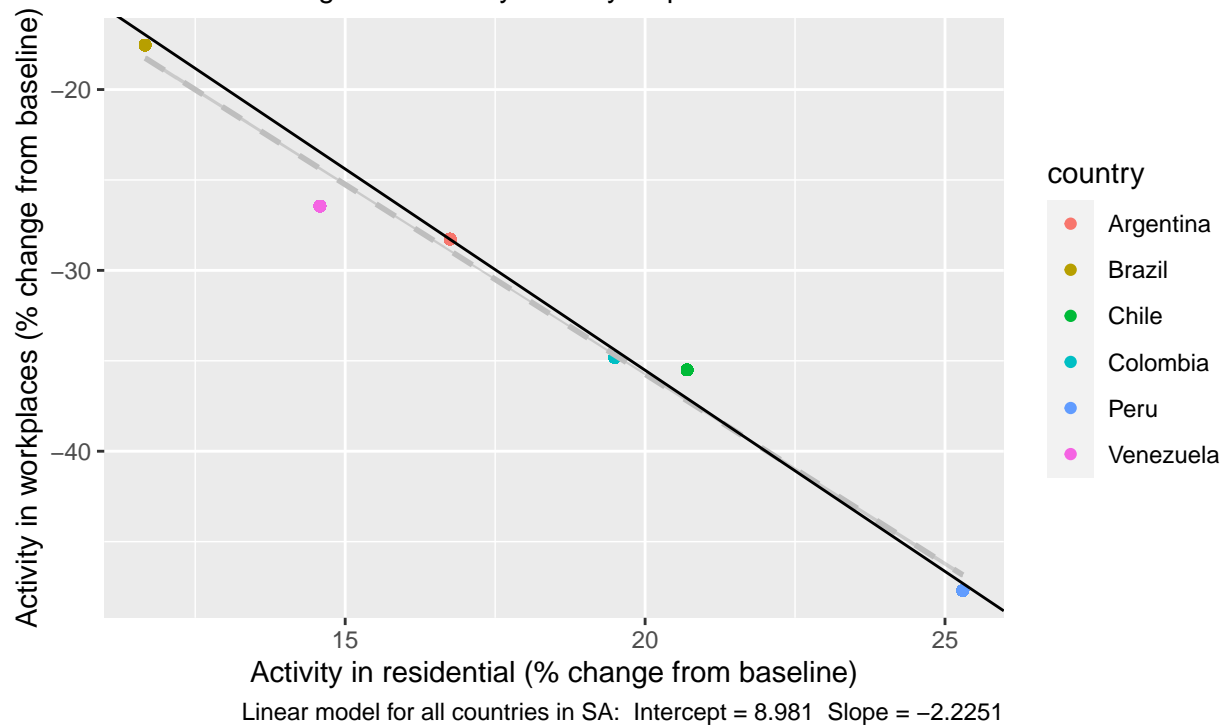
The intercept for the linear model for South America is a positive value, whilst the intercepts for the Europe and North America linear models are both negative. The slope for South America is also a larger negative value, whilst the slope for Europe and North America are fairly similar. Both these measurements indicate that there must be a cause for why South America is different, whilst Europe and North America are almost the same. This could be due to the fact that Europe and North America are both in the Northern Hemisphere, and South America in the Southern Hemisphere.

We have looked at the relationship for time in residential places against the time in workplaces during the pandemic this year and come to the conclusion that there is a linear relationship where as the time in workplaces decreases, the time in residential places increases. We go on to study how this affects activity in retail and hospitality services. As lockdown measures are implemented, people are asked to stay at home. This decreases the amount of people going into workplaces, and in turn decreases the activity in retail and hospitality services. A plausible reason for this might be since less people are going into workplaces, there is less people directly walking past shops before, during and after work, so less overall activity.

References

Gassen, 2020, *Download, Tidy and Visualize Covid-19 Related Data.* [online] Available at: https://joachim-gassen.github.io/tidycovid19/

Google, 2020. *COVID-19 Community Mobility Report.* [online] Available at: https://www.google.com/covid19/mobility/