

Can we find a correlation between air travel and Covid related incidents?

Team 5

Abstract

Our group wanted to examine the relationship between air travel and Covid cases and deaths. In particular we wanted to discover what impact air travel had on Covid cases and deaths. We were also interested in finding how counties which had airports were affected by Covid versus counties which do not have airports. Surprisingly we found that the reducing levels of air travel did not lead to similar trends in the levels of Covid cases in Ireland.

Data Preparation

Data Collection

From the datasets provided to us we decided to use the datasets *CovidStatisticsProfileHPSCirelandOpenData*, *Covid19CountyStatisticsHPSCireland* and *daily_traffic_variation*. The *CovidStatisticsProfileHPSCirelandOpenData* dataset was chosen as it provided us with useful information such as Confirmed Covid Cases, Confirmed Covid Deaths, Total Confirmed Covid Cases etc. This type of data proved very useful in our analysis for measuring the relationship with air travel data. The *Covid19CountyStatisticsHPSCireland* dataset allowed us to view interesting data like population proportion Covid cases so that we could compare counties with airports like Dublin, Mayo etc with counties without airports like Leitrim and Tipperary. The dataset *daily_traffic_variation* was important in allowing us to retrieve data about the number of daily flights in Ireland during 2020. All csv files were collected using Python and Jupyter Notebooks.

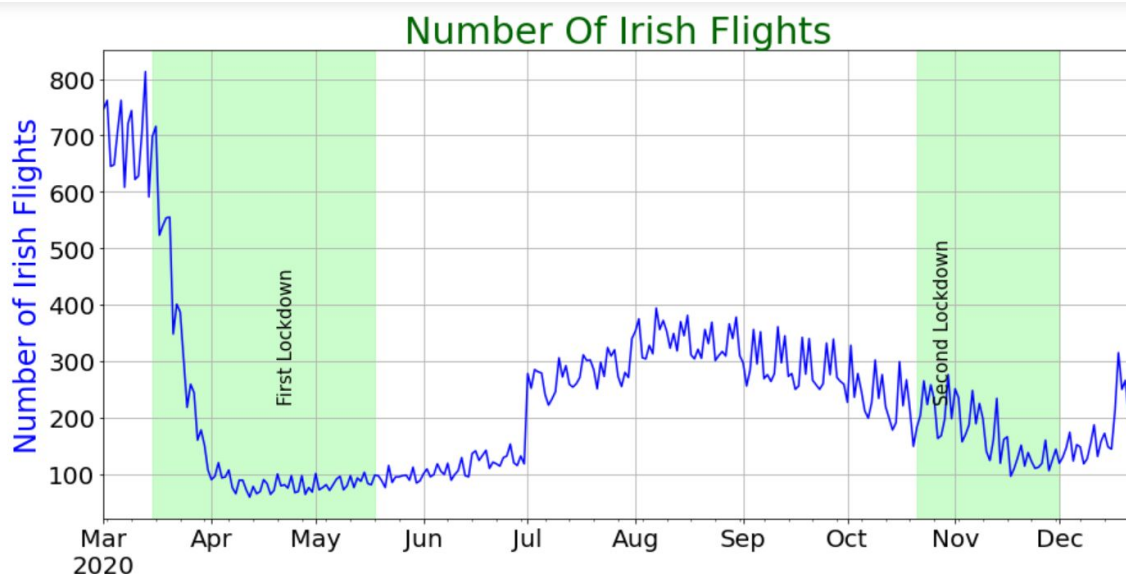
Data Cleaning

Our data was very noisy to begin with in the air traffic data sets, the original csv file contained over 12,000 rows! We used simple for loops to eliminate the rows that did not contain the Irish data and added the remaining Irish data to a Pandas dataframe. We then removed the columns we did not seem useful for relevant for the purpose of this study. Moreover, we wrote a few basic functions to calculate monthly averages for comparative purposes.

The dataset *Covid19CountyStatisticsHPSCIreland* contained a lot of information that wasn't relevant to our studies. We were only interested in total Covid figures and so had to remove the redundant columns which had data related to sex and age. We removed unnecessary columns using built in Python functions such as `df.drop()`. We removed initial rows of the Covid cases dataframe and Air Traffic data dataframe so that they shared the same starting index date before merging them into the one dataframe. Using this new dataframe interesting graphs and insights were drawn.

Interpretation & Evaluation of Results

Effects of the Lockdowns

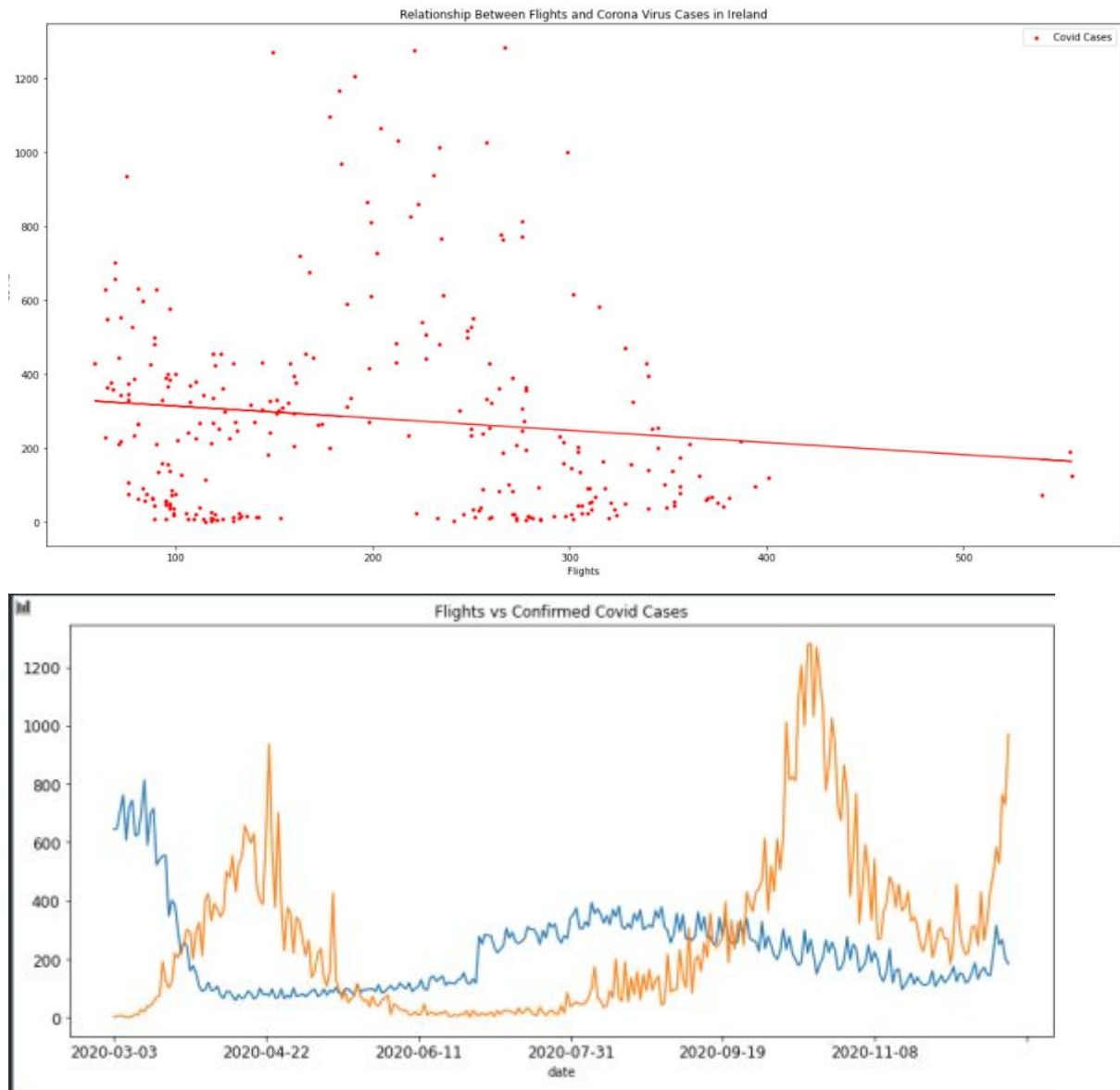


It is very clear that the government organised “Lockdowns” in Ireland has caused a great drop in the number of flights to and from Ireland. The Irish Government recommended that Irish people stay within 2km of their homes during the lockdowns for non-essential travel. We can see that the weather generally improves in the Summer months and as restrictions were eased, the number of people flying increased. However it seems that the amount of people flying in these months is still not near the pre-lockdown levels, as you would assume that more people would be using airports in the Summer.

Relationship between air travel and daily Covid cases

The first thing we examined was the relationship between the air traffic in Ireland and the number of Covid cases. We did this by plotting a scatter plot of the number of flights versus the number of confirmed daily cases and creating a time series that displayed how both the number of flights and the number of cases progressed over time. We were also able to plot a line of best fit on the scatter plot and display the correlation

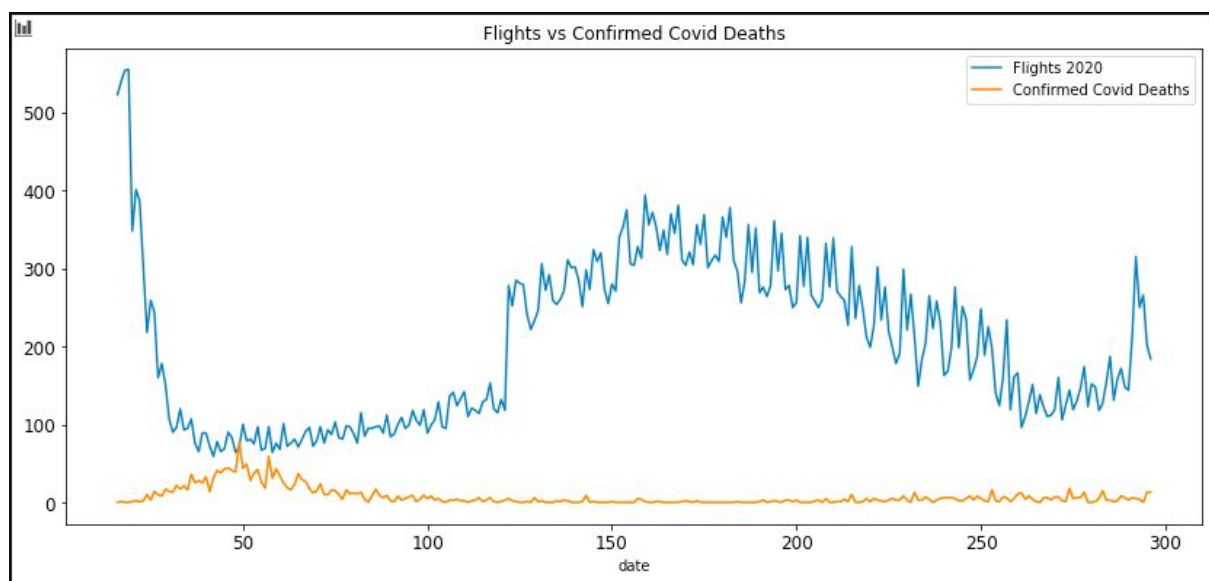
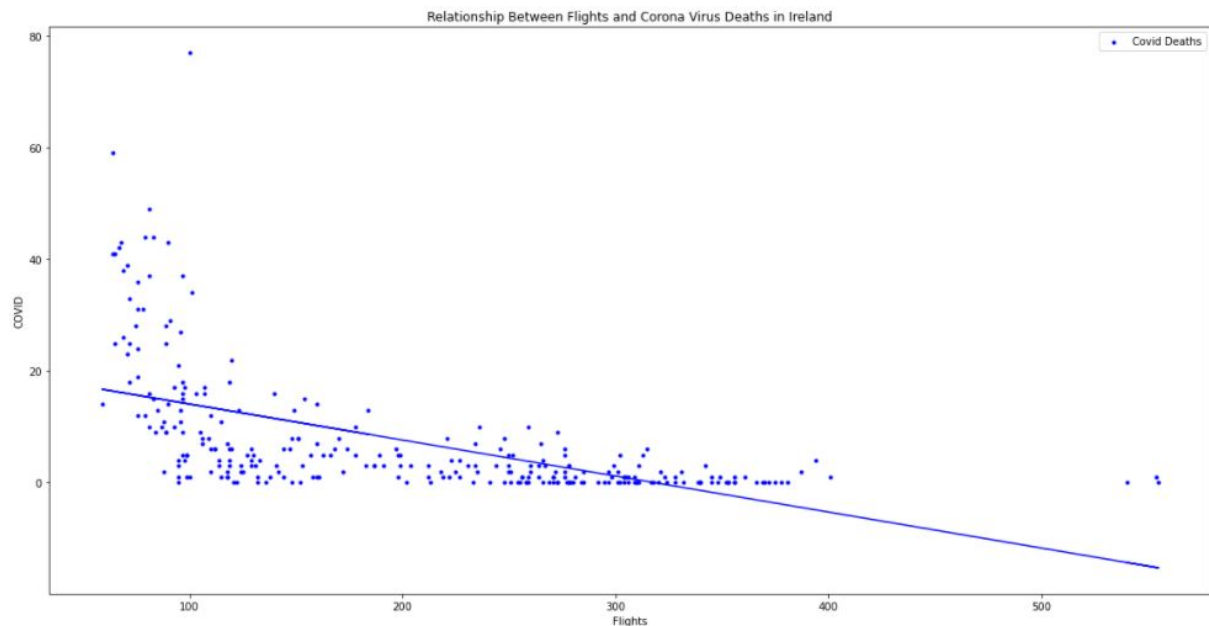
coefficient. We were surprised to find out that there was a very weak negative relationship between the number of flights and the number of cases. The correlation coefficient was just -0.12, although upon inspecting the scatter plot, we could identify many outliers. Upon inspecting the time series, we recognised that the trends of the number of cases and the number of flights simply did not correlate.



Relationship between air travel and daily Covid deaths

Next, we examined the relationship between the air traffic in Ireland and the number of Covid deaths. Once again, we used a scatter plot with a line of best fit and a time series graph to interpret the results. This time we found that there was a weak moderate relationship between the number of flights and the number of Covid deaths, since the correlation coefficient was -0.57. Although the fact that the correlation coefficient was negative implies that as the number of flights increased, the number of Covid deaths

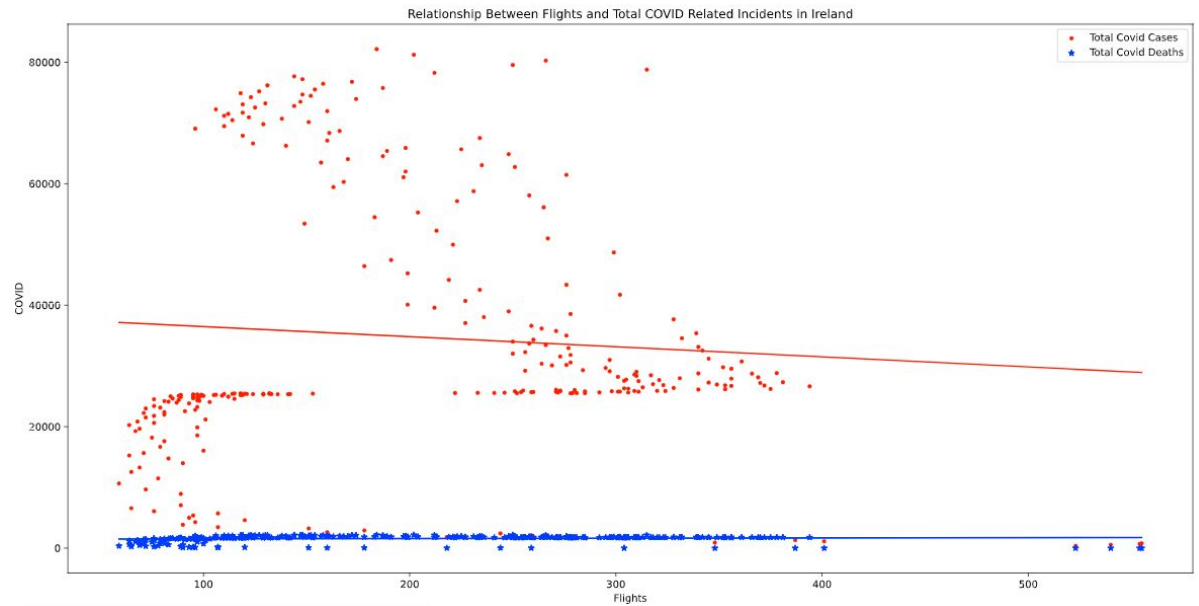
actually decreased. Once again, upon inspecting the time series, we observed no correlation between the trends of the number of flights and the number of confirmed cases.



Relationship between air travel and total number of Covid cases and deaths

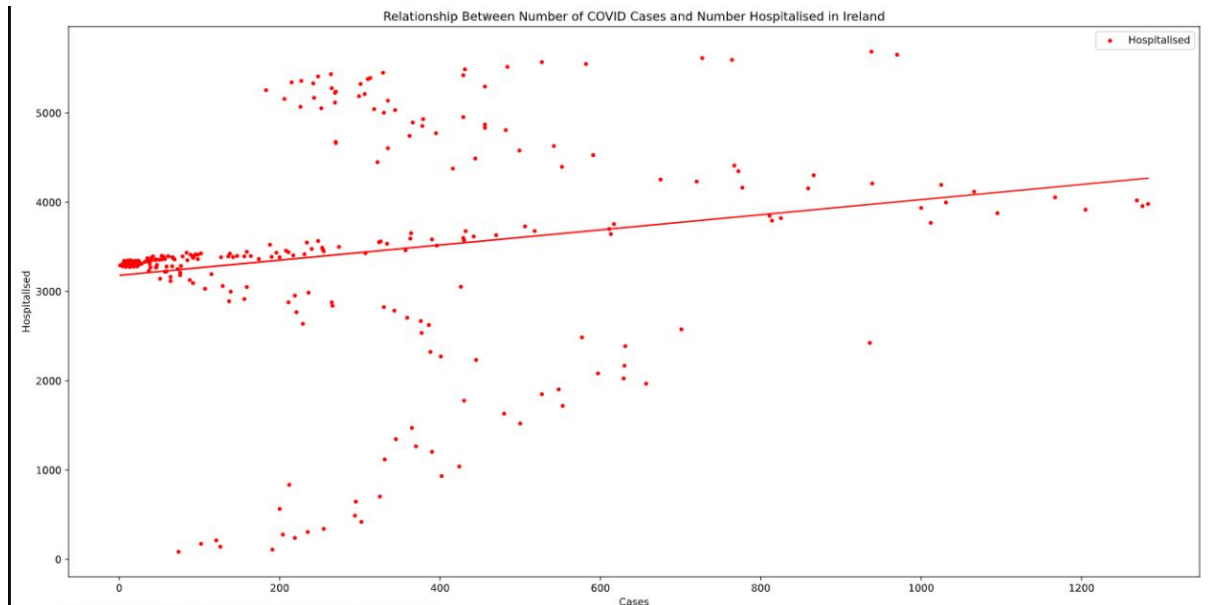
Next, we examined the relationship between the number of flights and the total number of Covid cases and deaths. We did this using a scatter plot with two lines of best fit. We found that the relationship between the number of flights and the total number of Covid cases and deaths was extremely weak with correlation coefficients of just -0.06 and 0.13

respectively. This suggests that the number of flights did not have a significant effect on the number of Covid cases and deaths in this country.



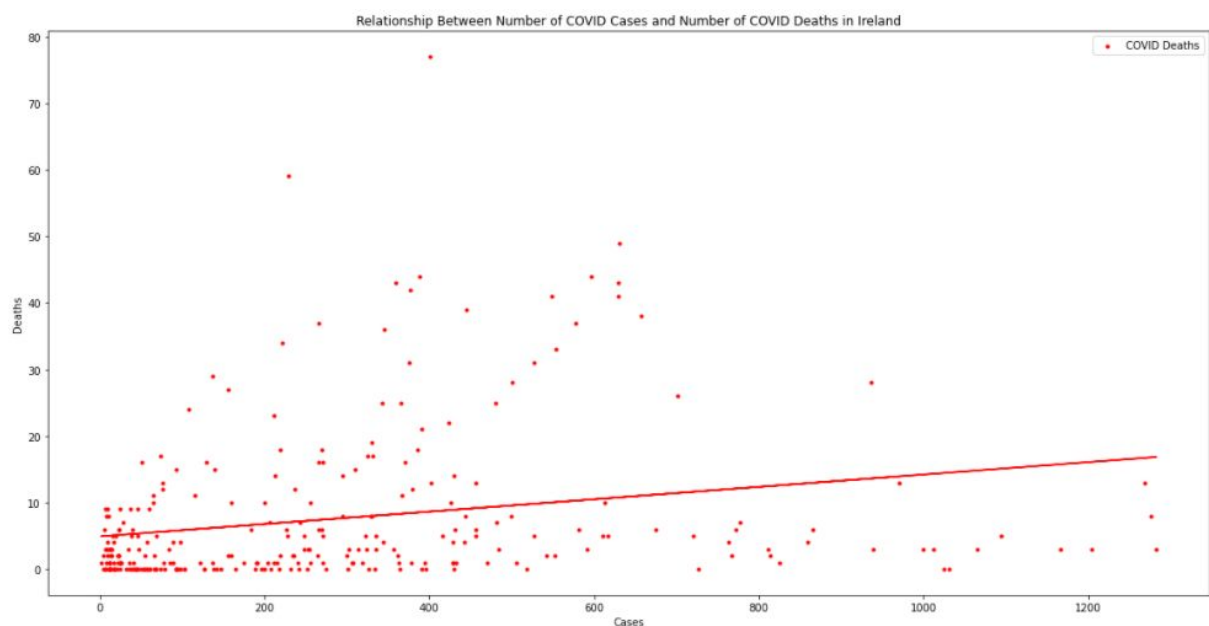
Relationship between daily Covid cases and the number of patients hospitalised due to Covid

Next, we examined the relationship between the number of daily Covid cases and the number of patients hospitalised due to Covid. We did this using a scatter plot with a line of best fit. We found that the relationship between the daily Covid cases and the number of patients hospitalised due to Covid was very weak with a correlation coefficient of just 0.2. This might suggest that not many people who contract the virus need to go to hospital, which also might suggest that most of the people who contract the virus do not have underlying health conditions or are old.



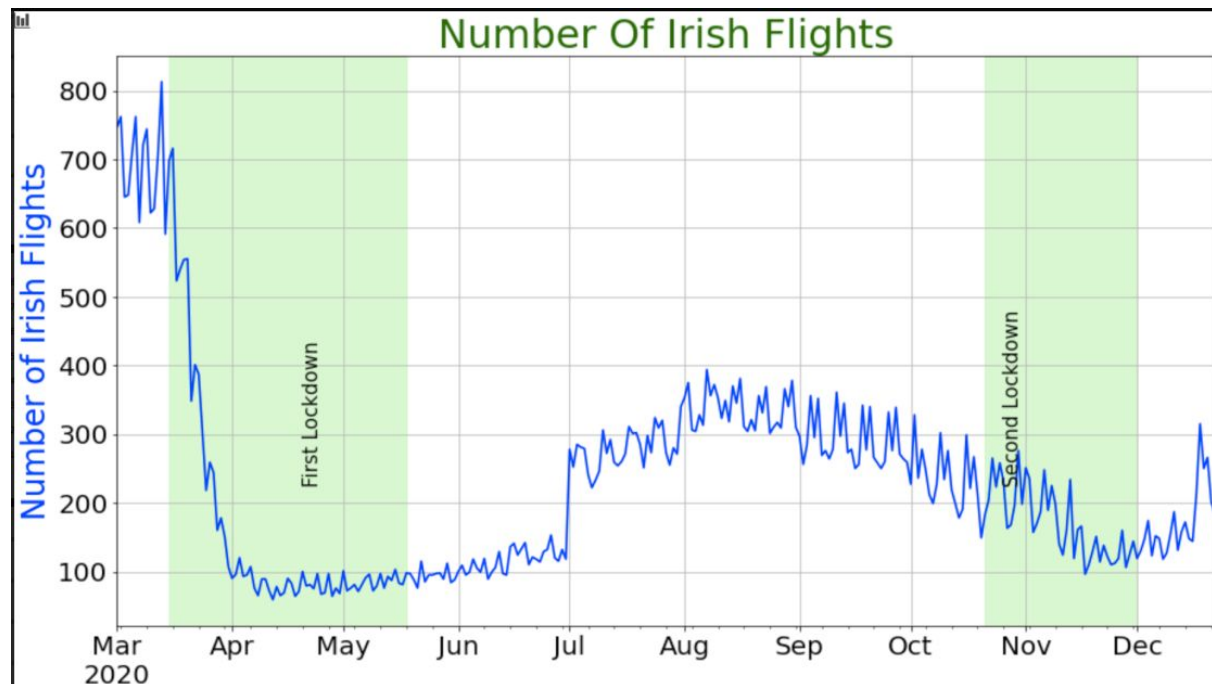
Relationship between daily Covid cases and daily Covid deaths

Next, we examined the relationship between the number of daily Covid cases and the number of Covid deaths. We did this using a scatter plot with a line of best fit. We found that the relationship between the daily Covid cases and the number of Covid deaths was very weak with a correlation coefficient of just 0.23. This might suggest that the virus has a very low mortality rate. However, it is worth noting that the scatter plot did contain many outliers.



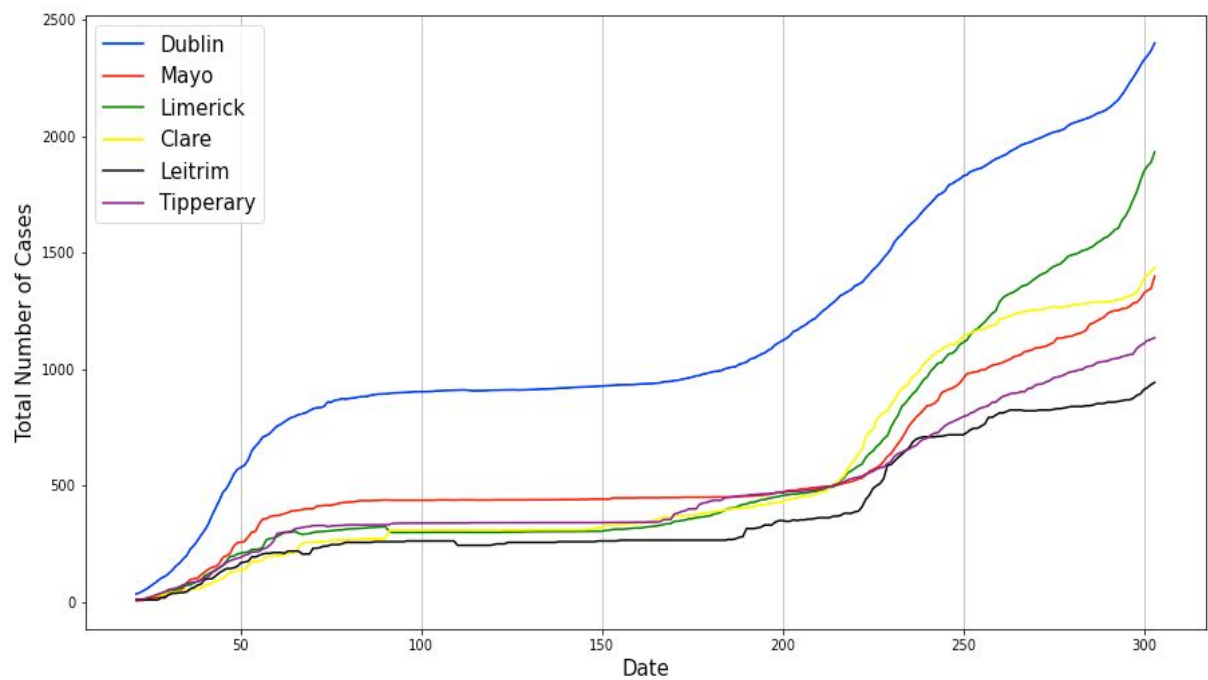
Progression of number of flights with respect to time

Next we decided to analyse how the number of flights changed over time. We did this by creating a time series that highlighted the number of flights during both lockdowns. We could see that the number of flights underwent descents as both lockdowns began.



Progression of number of Covid cases in counties and regions with airports and counties without airports with respect to time

Next we decided to analyse how the number cases in Dublin, Mayo, Limerick, Clare, Leitrim and Tipperary changed over time. We did this using a time series and found that cases seemed to be higher for counties that did have airports than those that didn't and as well as that, counties with airports seemed to have sharper ascents.



Conclusions

The following are the main conclusions we came to as a result of interpreting and evaluating our graphs.

- ➔ Number of flights do not affect number of Covid cases significantly
- ➔ There is no clear relationship between the number of people who contract the virus and the number of people who are hospitalised or die as a result of contracting it

Conclusion

After analysing the data we came to the conclusion that there was no strong correlation between the number of flights or air travel and the number of Covid cases in the country. We would have expected to see a rise in the number of Covid cases once the airports reopened in mid summer. We also saw a big rise in the number of Covid cases in late Autumn whereas the number of air travel stayed relatively quiet.

Furthermore, it would appear that the international airports have necessary Covid-19 procedures and controls, to prevent an extreme spread of the virus. A promising sign.