Analytical analysis of COVID-19's impact on unemployment and travel in Australia

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Motivation & Summary

Did COVID-19 significantly influence the Australian Economy? Will it significantly impact us in the future?

To answer this, the factors that were analysed were unemployment and international travel

Hypothesis

That COVID-19 would have a significant impact on unemployment rate and international travel, leading to greater unemployment and reduced international travel.

Null: That COVID-19 has no significant impact on unemployment rate and international travel, the trend before and after COVID-19 began would be the same.

Hypotheses

- If Covid-19 impacted unemployment, it is expected that the states would be impacted differently, in line with their experiences with covid.
- If Covid-19 impacted unemployment, it is expected that it would affect both genders equally, and this trend would be seen across multiple states.
- If Covid-19 impacted both employment and the national arrivals of Australian citizens, it is expected that there will be a negative correlation between these variables during Covid-19.
- If Covid-19 impacted both employment and the national departures of Australian citizens, it is expected that there will be a negative correlation between these variables during Covid-19.

Data Selection

Australian Unemployment Data:

https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/nov-2020

Name: Table 02. Labour force status by State, Territory, Greater capital city, Rest of state (ASGS) and Sex

Date Retrieved: 12/1/21

Data Format: Excel Spreadsheets

Organisation: Australian Bureau of Statistics

Australian Arrivals and Departures Data:

https://www.abs.gov.au/statistics/industry/tourism-and-transport/overseas-travel-statistics-provisional/nov-2020

Name: Total Movement, Arrivals and Departures - Country of Citizenship

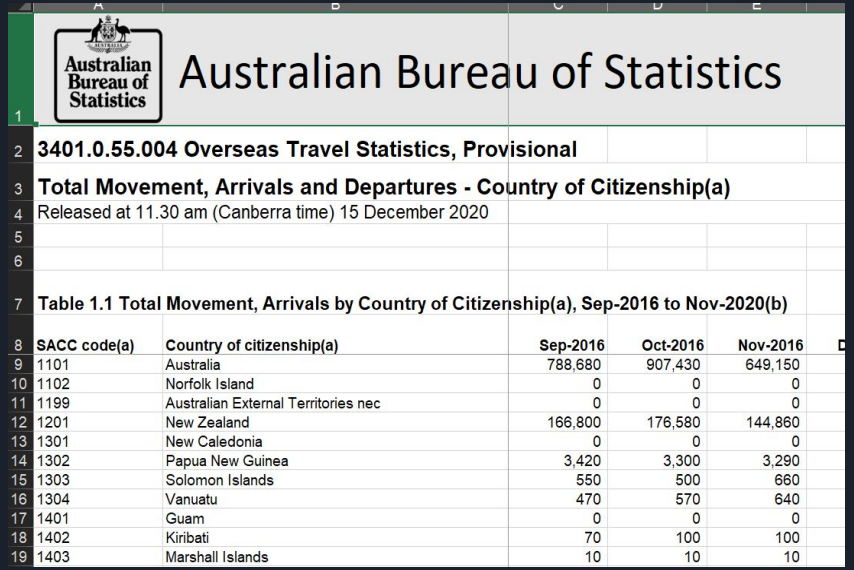
Date Retrieved: 12/1/21

Data Format: Excel Spreadsheets

Organisation: Australian Bureau of Statistics

Data Exploration

- When exploring unemployment data, line graphs were used as these are the most appropriate for time series data
- When exploring the relationship between travel and unemployment, scatter plots were used as this is the most appropriate graph
- To examine the impact of COVID-19 we considered the timepoints before and after COVID-19 was declared a Public Health Emergency (PHE) by the World Health Organisation on January 30, 2020



Australian Bureau of Statistics

3401.0.55.004 Overseas Travel Statistics, Provisional

Total Movement, Arrivals and Departures - Country of Citizenship(a)

Released at 11.30 am (Canberra time) 15 December 2020

Table 1.1 Total Movement, Arrivals by Country of Citizenship(a), Sep-2016 to Nov-2020(b)

SACC code(a)	Country of citizenship(a)	Sep-2016	Oct-2016	Nov-2016
1101	Australia	788,680	907,430	649,150
1102	Norfolk Island	0	0	0
1199	Australian External Territories nec	0	0	0
1201	New Zealand	166,800	176,580	144,860
1301	New Caledonia	0	0	0
1302	Papua New Guinea	3,420	3,300	3,290
1303	Solomon Islands	550	500	660
1304	Vanuatu	470	570	640
1401	Guam	0	0	0
1402	Kiribati	70	100	100
1403	Marshall Islands	10	10	10

Public Health Emergency Reference :
https://www.who.int/news/item/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)

Data Cleanup

Cleanup process:

- Read csvs in and index the header, columns and footer locations and merge them into one
- Reset indexes
- Split date to new columns of date and year

	Date	Month	Year
0	Jul-1991	Jul	1991

- Transposing the data
- Renamed columns
- Check types of the data and correct when needed

Difficulties:

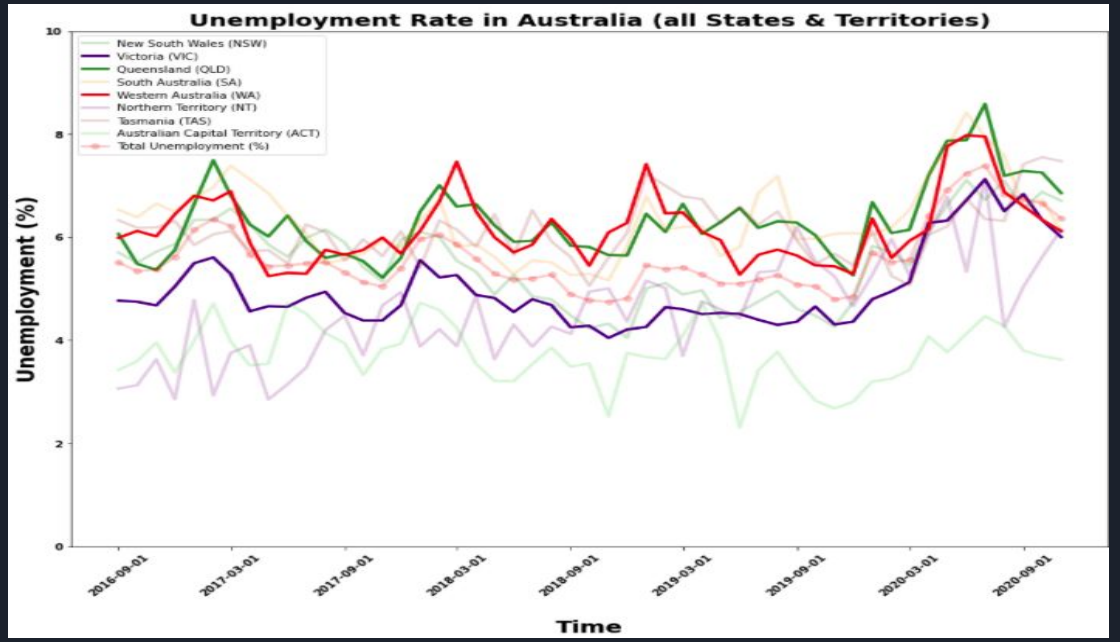
- Difficulties reading column names
- Over 883 columns in merged final dataframe

	Date	Australia ; Employed total ; Persons ;	Australia ; Employed total ; > Males ;	Australia ; Employed total ; > Females ;	Australia ; > Employed full-time ; Persons ;	Aus Emp full- > M
0	Jul-1991	7583.0	4398.2	3184.8	5900.9	4
1	Aug-1991	7620.7	4398.6	3222.1	5902.2	3

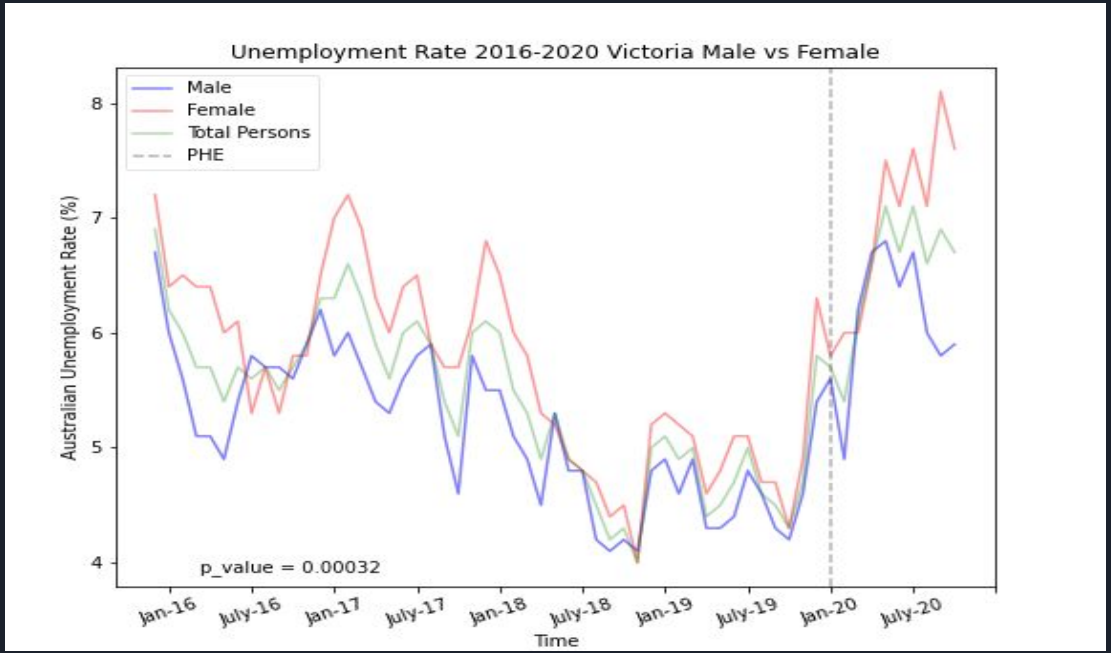
Does Unemployment rate differ across Australian states?

Findings:

- States were not statistically different (pvalue=0.71855)
- Most states had a general steep increase in unemployment after COVID-19 was deemed a Public Health Emergency (PHE)
- However Queensland, Victoria and WA were deemed to have the most interesting trend with a steep increase from 5% to almost 9%.



Is there a difference between unemployment rate between genders across states?

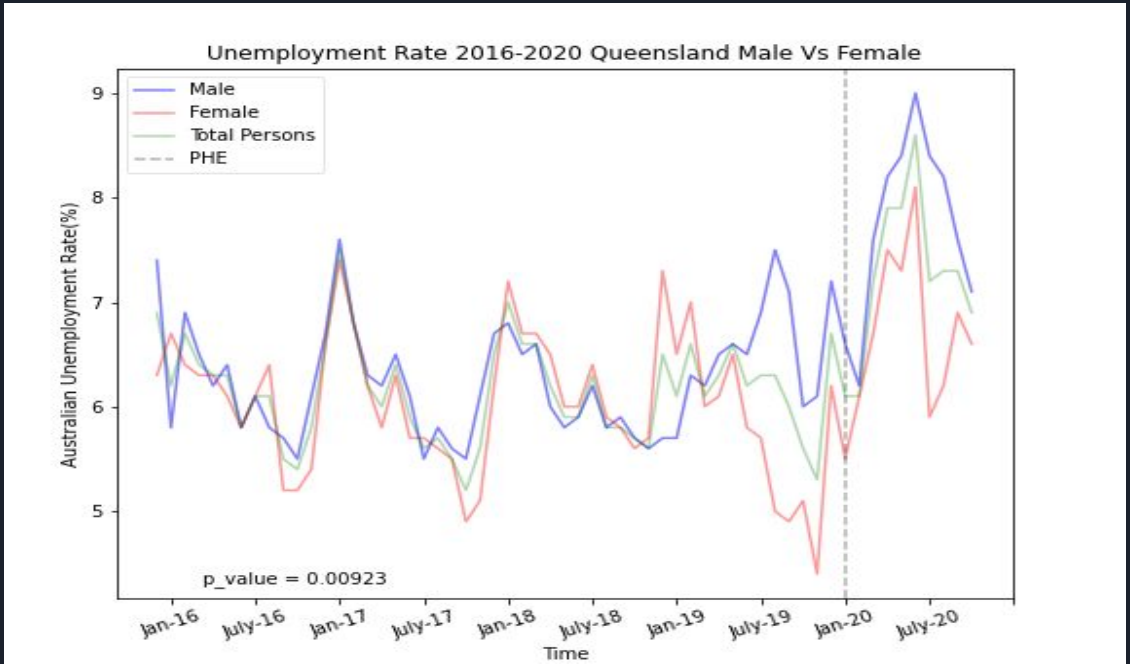


Victoria

Findings:

- Genders significantly different(p-val = 0.00032)
  P-val = 0.00032
- Gender inversely correlated after PHE.
- PHE = Public Health Emergency declared for COVID-19 (WHO).
- PHE to separate before/during COVID.

Is there a difference between unemployment rate between genders across states?

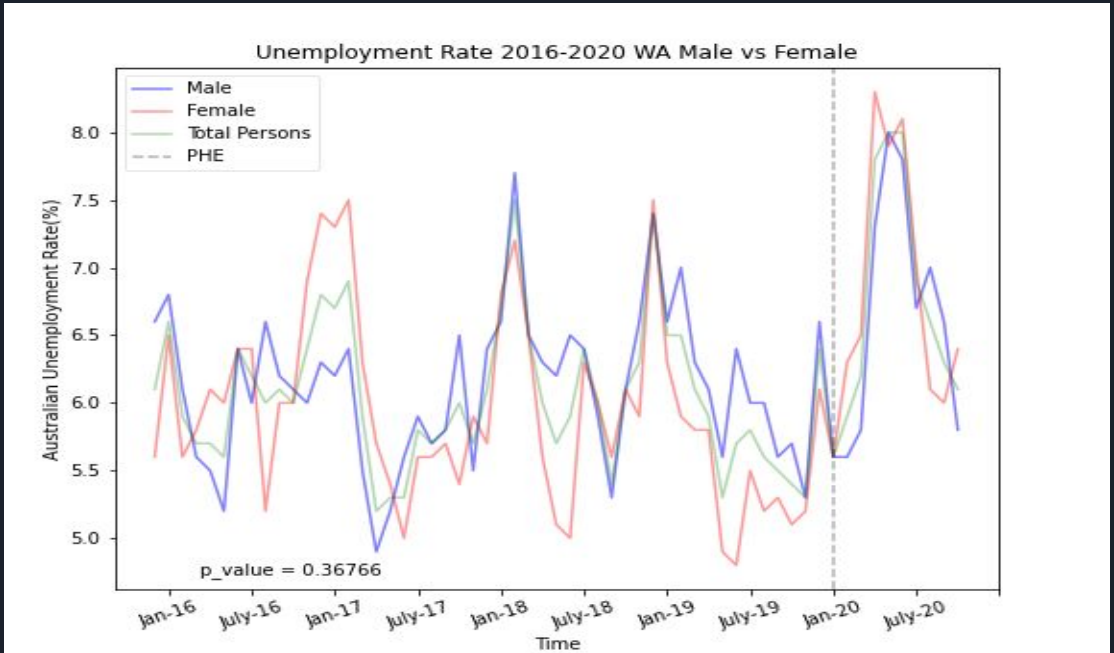


Queensland

Findings:

- Significantly different genders.
  P-val = 0.00923
- Males higher rate, but similar trend.

Is there a difference between unemployment rate between genders across states?



P-val = 0.36766 (Non-Significant)

Western Australia

Findings:

- Non-significant difference ($p > 0.05$)
- Little difference in gender unemployment rate.

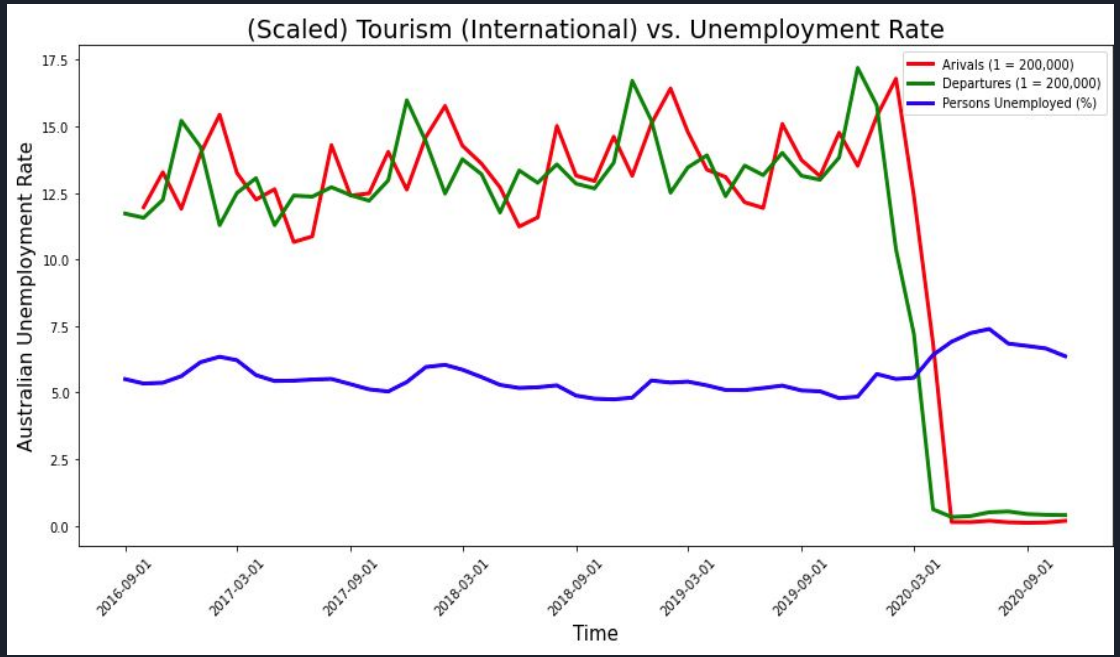
Conclusion

- States Significantly different.
- There was some difference between genders (QLD/VIC)
- Null supported.

What is the Correlation between Unemployment/Travel?

Findings:

- Unemployment and travel and statistically different (P-val) as seen in the data post-covid.
- The graph shows an inverse correlation between to two parameters.

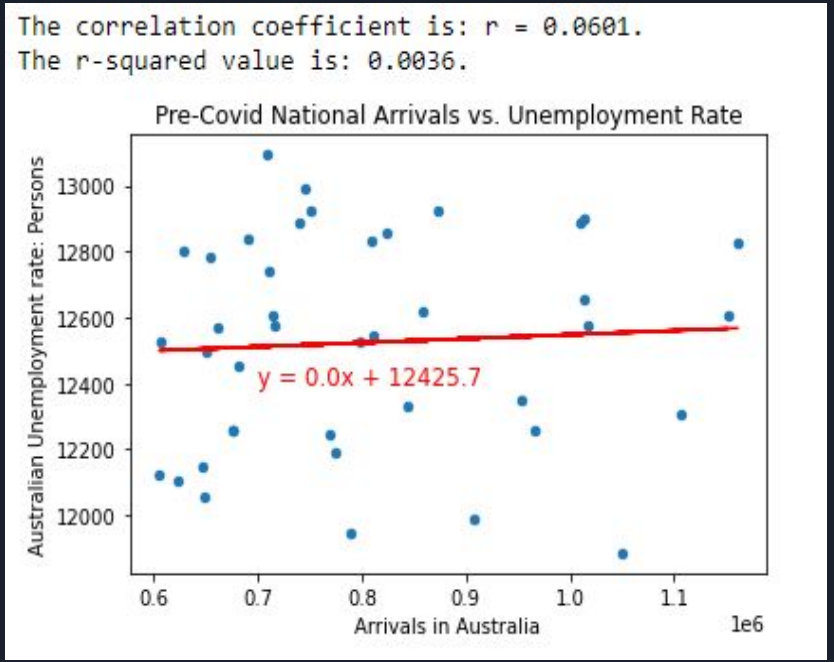


Is there a negative correlation between the unemployment rate and national arrivals in Australia?

Findings:

- The correlation coefficient value of 0.0601 suggests that there is no real relationship between the unemployment rate and national arrivals in Australia

- The r squared value of 0.0036 displays that there is no correlation between the variables. This means that the amount of national arrivals over time before coronavirus was not influenced by the unemployment rate.

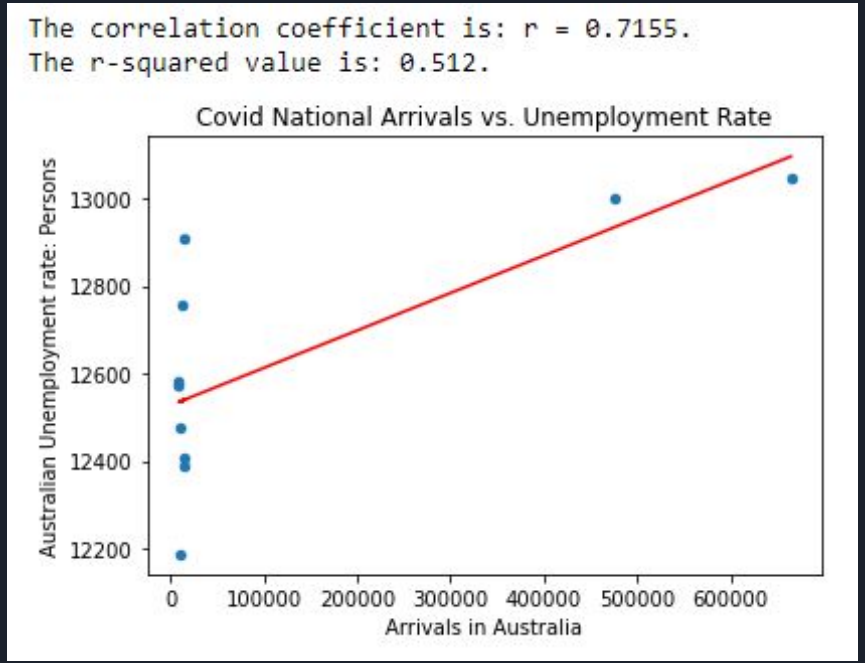


Is there a negative correlation between the unemployment rate and national arrivals in Australia?

Findings:

- The correlation coefficient of 0.7155 displays that there is a strong positive correlation between arrivals and unemployment after covid had been declared a pandemic.

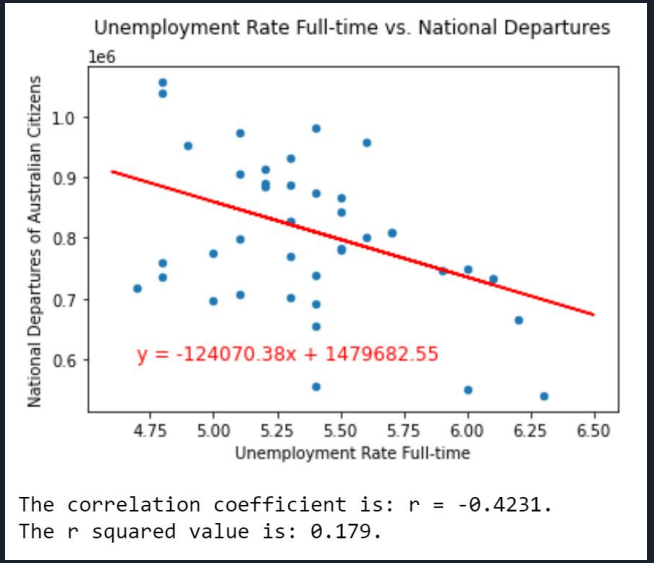
- The r squared value is 0.512 which indicates there was a high to moderate effect of arrivals on the national unemployment rate.



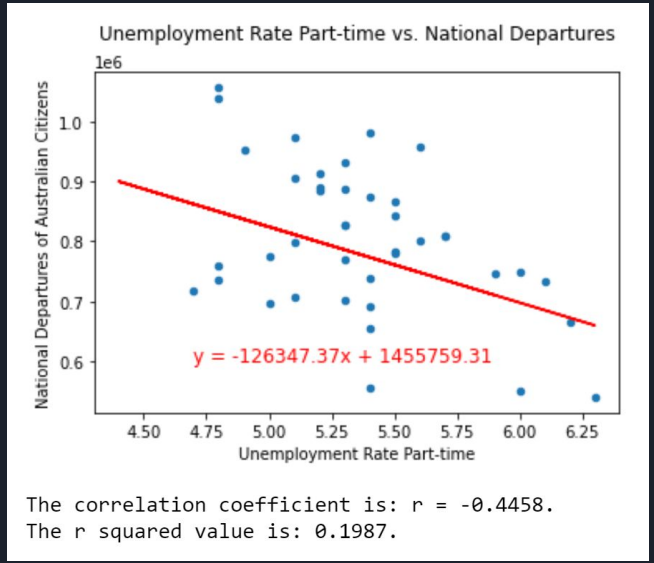
Is there a negative correlation between Unemployment and National Departures pre-Covid-19?

- Low to moderate, negative correlation between variables
- Correlation coefficient: r = -0.4503
- R squared value: 0.2028

Pre-Covid Fulltime/Parttime Unemployment Rates Comparison



The correlation coefficient is: r = -0.4231.
The r squared value is: 0.179.

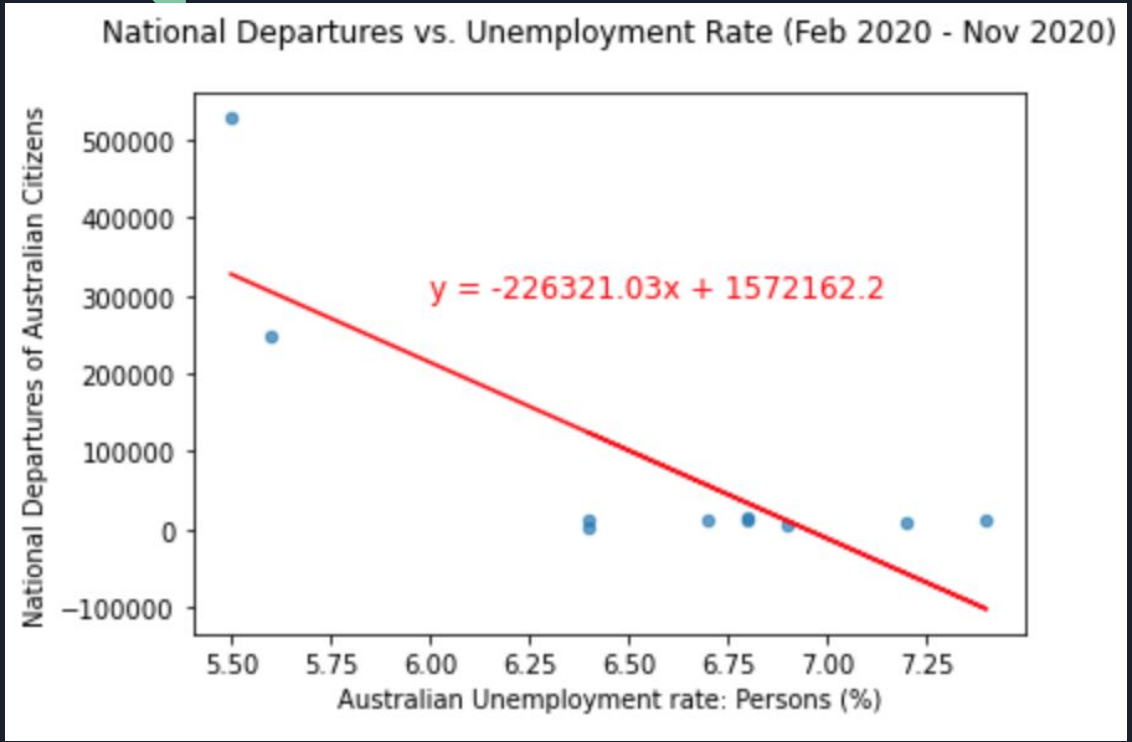


The correlation coefficient is: r = -0.4458.
The r squared value is: 0.1987.

Findings:

- There is a weaker negative correlation between unemployment rate and departures for part time and full time.

Is there a negative correlation between Unemployment and National Departures during COVID-19?



- Strong, negative correlation between variables
- Correlation coefficient: r = -0.8132
- R squared value: 0.6613

Conclusion

- The analysis showed that Covid-19 did influence the unemployment rate of Australians and their ability to travel. In particular:
    - **Unemployment Across states:** The changes in unemployment rate across the states was not found to be statistically significant.
    - **Unemployment between genders across states:** The analysis did not support the hypothesis as the unemployment rates of the genders followed different trends in each state. There was not a common trend in the way COVID-19 affected unemployment.
    - **Unemployment vs Arrivals:** In contrast to the hypothesis, there is a positive correlation between the unemployment rate in Australia and the arrivals of Australians into the country during COVID-19. However, due to the border closures and other circumstances, the data used to come to this conclusion was limited.
    - **Unemployment vs Departures:** In line with the hypothesis, a negative correlation was seen between unemployment rate and the national departure of Australian citizens during COVID-19. However, the data leading to this result was limited.

Difficulties and Future Research

Challenges that arose:

- Were unable to consider state based travel, as data was only available in a National context.
    - Resulted in an update of the hypotheses
- Difficulties in predicting future trends as the data is limited and Covid-19 is ongoing.

Possible Future Research for the effect of Covid-19:

- Unemployment rate per industry
    - Were some industries more affected than others?
    - Can this explain the differences in unemployment between sexes?

- Tourism data
    - Considering the travel data for non Australian citizens
    - Does tourism have an impact on unemployment rate?

Questions?