[Ali, Chi, Zhou]

[In the current turbulent international political & business environment, most recent incidents being COVID-19 and Ukraine Russian War. New Zealand government has to react accordingly to maintain the prosperity of our economy. How would these economical policy affect our main national economical activities, more specifically our national transportation carrier’s performance. ]

[Insight into New Zealand economics

A data science approach]

[Team Asclepius Project Report]

## Project Report

### Overview :

### What data model is in our minds for which we collected our datasets?

We intended to create a relational database that store both the New Zealand monteary policy data as well as NZ’s economical activities data. This relationship database would contain key monetary policy indicators, along with major NZ economical activities historical data. The relationship type between most of these entities are one to many.

### Who is or can use our data model?

The intended users of our data sources are Like Air New Zealand senior management, KiwiRail senior management, Tourism New Zealand senior management and Reserve Bank policy maker, various Ministers etc, who will be interested in finding how does NZ economical policy impact economy more specifically the chosen industry : Freight, Air Transportation and Tourism visit.

### A: What data sources you used :

We have scraped data source such as 1) Historical CPI data, 2) Historical New Zealand Exchange Rate data, 3) Historical New Zealand Cargo Freight Transportation data, 4) Historical New Zealand Air Freight Data, 5) Historical New Zealand Tourism Count, 6) New Zealand Employment Historical records (Employment and Unemployment rate)

### B : Why you choose those data sources

New Zealand is a relatively small economical entity that heavily rely on overseas business. Facing an increasing turbulent international political and economical environment, in order to maintain our prosperity, in depth analysis on how New Zealand vital economical policy impact on our main economical activities are not only useful but also crucial for the success of these New Zealand companies, such as Air NewZealand, Kiwi Rail and Tourism New Zealand. We are also interested to find out how does these monetary policy figure influence the overall employment situation.

### C : What target you chose (I.e.n what is the intended use of the data, …)

The data source we are building is intended to be used for building and training prediction model for New Zealand companies, so they can review the past historical records and potentially build a prediction model using machine learning algorithms like (Linear gradient, SVM). And hopefully such prediction model can be used to facilitate company’s budgetary planning,

By analyzing company performance data such as Annual Income VS historical transportation statistics VS. New Zealand Government monetary policy data such as CPI, Exchange Rate, Import Taxation.

Should we include more over seas government data such Import Tax of China, US. Dollar CPI. Join these such data together, we are potentially able to produce a prediction mode trained with these historical data. Utilization of such prediction model will enable company to device forward strategies for increase or decrease production capabilities. Such company strategies will further enable its finance / accounting department on allocate investment budgets as well as income forecasting. Whether or not company should be hiring new employees and purchasing new equipment will depends upon such forward strategies.

### D : What difficulties you have to overcome to wrangle the data sources into the target data model

We faced difficulties of finding keys between these entities, these historical data are not collected with the same frequencies. Some of them are collected on annual base, some of them are collected on monthly base and some of them are collected on quarterly basis. We need to wrangle these data to form unified keys for further construction of the relationship between these entities.

### E : What techniques you did see

For data scraping, various techniques have been utilized for direct data file downing, web scraping as well as calling API for data retrieval.

### F : What you managed to achieve and what you failed to do

Our team decided to collect data that relates various social & economical activities in New Zealand; we will attempt to collect monetary policies data such as CPI, HPI, Exchange Rate as well as Inflation. Other economical activities data such as but not limited to “Transportation data”, “Ferry data”, “Tourism Satellite Account”.

The aforementioned data could come from different types of sources, we have observed data source type like “html”, “pdf”, “csv”, “excel file” and “Rest api”.

We plan to retrieve aforementioned data via these different sources first, then through the process of data wrangling to transform these data sources into relational database;

The final deliverable of our project should be a relationship database, that contains all aspects of New Zealand economic activities as well as government monetary policies. Such database can be utilized for further data mining analysis as well as data visualization tasks. We will plot a simple flow chart diagram to indicates the correlation between some of the chosen data, for example “Exchange Rate” VS. “Tourism Satellite Account”. It is anticipated that as exchange rate drops, New Zealand dollar becomes cheaper, we should be able to observe an increase of “Tourism account”.



The relationship key between these entities are timestamps (Year, Month, Quarter); Based on economical principles, as New Zealand Reserve Bank sets its interest rate up, business will have difficult of getting cheap loans for further development, it is anticipated that business development will be reduced, which leads to increase of unemployment. On the other hand, increase of Reserve Bank interest rate will attract oversea hot money for short term investment, therefore it is anticipated that exchange rate of New Zealand dollars VS. Other currency will go up. The high Reserve bank interest rate will lead to lower level of economic activities, hence in term of cargo freight statistics, general vehicle activities and tourism account, we are anticipating dropping in these activities. However, Reserve Bank raise interest rate usually to combat high inflation rate (CPI), therefore, we should be expecting dropping of the CPI.

When the economic activities are low and unemployment rate is high, the government is under pressure to unleash new monetary policies to stimulate economy. Hence government usually resolve to lower reserve bank interest rate. With high reserve bank interest rate, we should be able to observe weak New Zealand dollars VS over currency. Thus make export of our products cheaper, therefore attracts more oversea orders, subsequently we should be able to observe an increase of freight transportation activities, oversea passage flights. To stimulate general economic growth, government usually starts major infrastructural projects like major road works, etc. Hence it is also anticipated that general road construction activities are increasing.

Freight Data :

<https://catalogue.data.govt.nz/dataset/freight-information-gathering-system>

Such data include Gross National Product and its components, Gross National Expenditure, Gross National Income in the National Income and Product Accounts, and also the capital stock and national wealth. In these examples data may be stated in nominal or real values, that is, in money or inflation-adjusted terms.

The Consumer Price Index (CPI) is a critical indicator of pricing pressures in an economy and provides a gauge of inflation. Forex traders monitor the CPI, as it can lead to changes in monetary policy by the central bank that will either strengthen or weaken the currency against rivals in the markets.

<https://www.investopedia.com/articles/forex/111015/how-cpi-affects-dollar-against-other-currencies.asp>

<https://tradingeconomics.com/new-zealand/consumer-price-index-cpi>

<https://www.rbnz.govt.nz/statistics/series/exchange-and-interest-rates/exchange-rates-and-the-trade-weighted-index>

## Project Diary

### Project diary - Group Asclepius

### (Ansar Ali, Jeffrey Chi & Jinze Zhou)

### 21-09-2022

Team had online meeting for the third time to discuss the direction of the project, we have decied to collect New Zealand economical data and formulate a database for further analysis.

### 21-09-2022

**Ansar** setup a repository on github and invited the the memebers to join the the repository as contributors.

### 19-09-2022

**Ansar** received the confirmation from both members about the git/github

### 19-09-2022

**Ansar** asked the group members if they are comfortable using git and github. If so he would create a repository for the Group Project.

### 19-09-2022

**Jinze** joined the discussion later and replied to **Ansar**'s email saying that he liked the two options and suggested if we go for the first one, he suggested:

* To focus on currency pairs between free market economies, e.g. USDJPD/ USDGBP, whose variables and complexity will be relatively more uncomplicated. There is an interesting model for currency rate, it's "Mundell–Fleming\_model: <https://en.wikipedia.org/wiki/Mundell%E2%80%93Fleming_model>

### 19-09-2022

**Jeffrey** replied to the email and showed concerns about the option given by **Ansar** and suggested taht due to market fluctuation and plus covid-19 there would be fluctuation which would make it hard to on those options.

**Jeffrey** suggested doing something more in the scientific data, like:

* Agricutluture, or
* health care

### 18-09-2022

**Ansar** initiated communication through email to collaborate on the project. He proposed two topics for the project:

* Predicting forex exchange rates based on scrapped data from apparently not related source.
* prediction of fuel prices based on what's happening around the world in terms of stability or unstability of different international factors.

## Slides or any other material for the data presentation

Please Power Point for details

## Jupyter notebooks with all the code you wrote

Please see attached Jupyter notebook

## The data you produce

Please see attached CSV files that contain our collected data