Assignment 3

Executive Summary

Dataset Summary

This dataset explores Australian exports and imports between 1988 and 2021. Australia is heavily reliant on global trade, particularly commodity exports such as iron ore and coal. The fact that the Australian dollar is the fifth most traded currency on the foreign exchange market demonstrates the importance of trade to the country. This dataset contains 10 main categories and 67 subcategories, with all categories measured in millions of Australian dollars ($AUD).

The main categories included are listed below:

- Food and live animals
- Beverages and tobacco
- Crude materials, inedible, except fuels
- Mineral fuels, lubricants and related materials
- Animal and vegetable oils, fats and waxes
- Chemicals and related products
- Manufactured goods classified chiefly by material
- Machinery and transport equipment
- Miscellaneous manufactured articles
- Commodities and transactions not classified elsewhere in the SITC

Data Preparation

The dataset contains a large number of price measurement variations, making cross-category analysis more difficult. To correct this, we can use some built-in Excel functions to generate some new statistics. Year-on-year changes, as well as relative category ratios, provide a more usable statistic for analysis.

Year on Year Change
This is a simple calculation and is presented as follows:

$$Year\ on\ Year\ Change\ = \frac{X_t}{X_{t-1}} \times 100,$$

Where x is the data category and t represents the year.

Yearly Relative Ratio
We are also able to create a statistic representing the percentage the import/export accounts for relative to the total import/export for the year. This is extremely useful if a particular export

declines between year 1 and year 2, it is useful to know if it declined singly or if all exports declined. To calculate the following calculation is used:

$$Yearly\ Relative\ Ratio\ = \frac{Category\ Total}{Yearly\ Total_t} \times 100,$$

Where t is the trade type (export/import)

Analysis

To analyse the dataset we will first look at a time series graph representing the Year on Year percentage change. To do this we will create a simple line chart for each category, separating exports and imports by colour seen in *Figure 1*. In tableau this is done by dragging the measure values and measure names into the row column, while utilising the colour feature to distinguish the trade type.

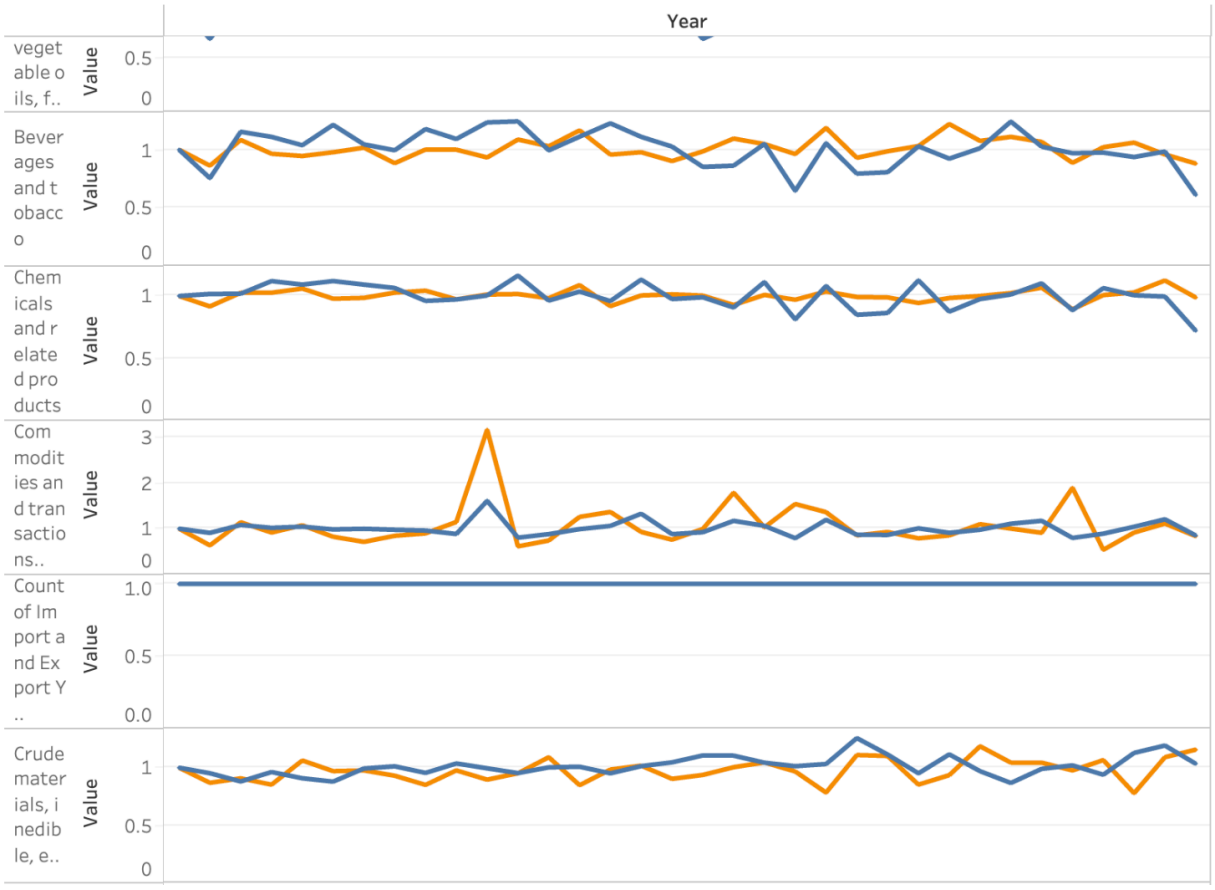


Figure 1: Year on Year Percentage Change All Categories

The next graph represents the Relative Ratio of one category against the total of all categories for a specific year. A stacked bar graph works well in this case and can be seen below in *Figure 2.*

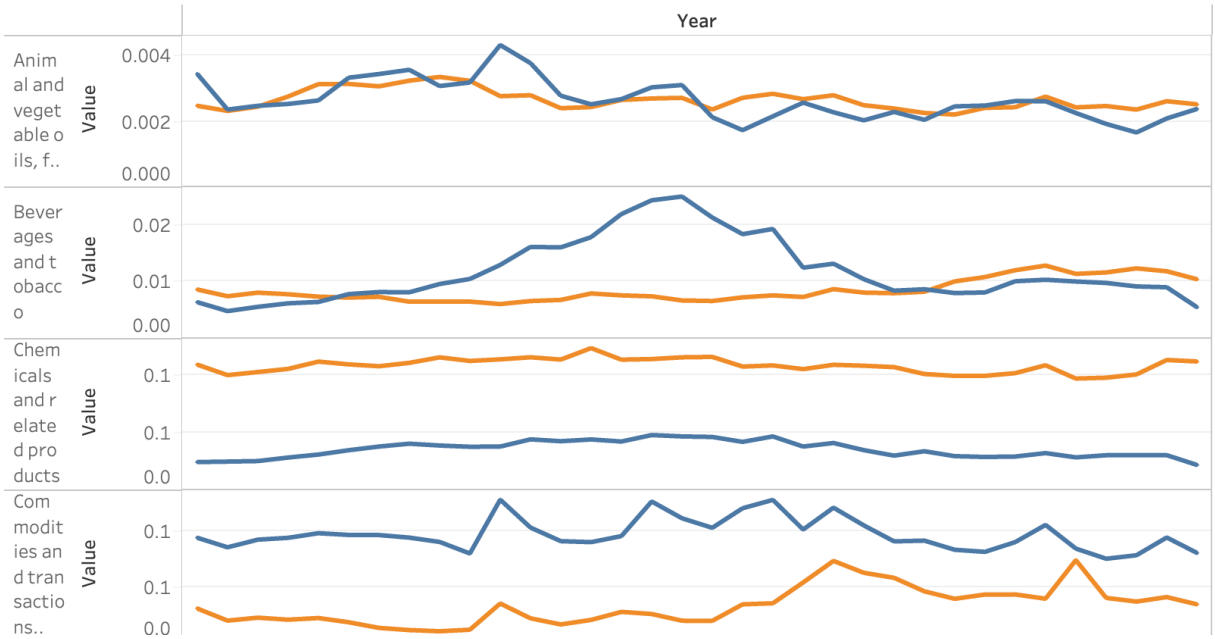


Figure 2: Relative Ratio of All Categories

The next graph we will look at is an area graph comparing data from the years 1988 and 2021. This analysis will allow us to determine the changes in industry at a glance by showcasing the composition of both imports and exports. Utilising Excel, we will create a new sheet with the required data fields from the respective years and then create an area graph. We will repeat this for both imports and exports and analyse the results below.

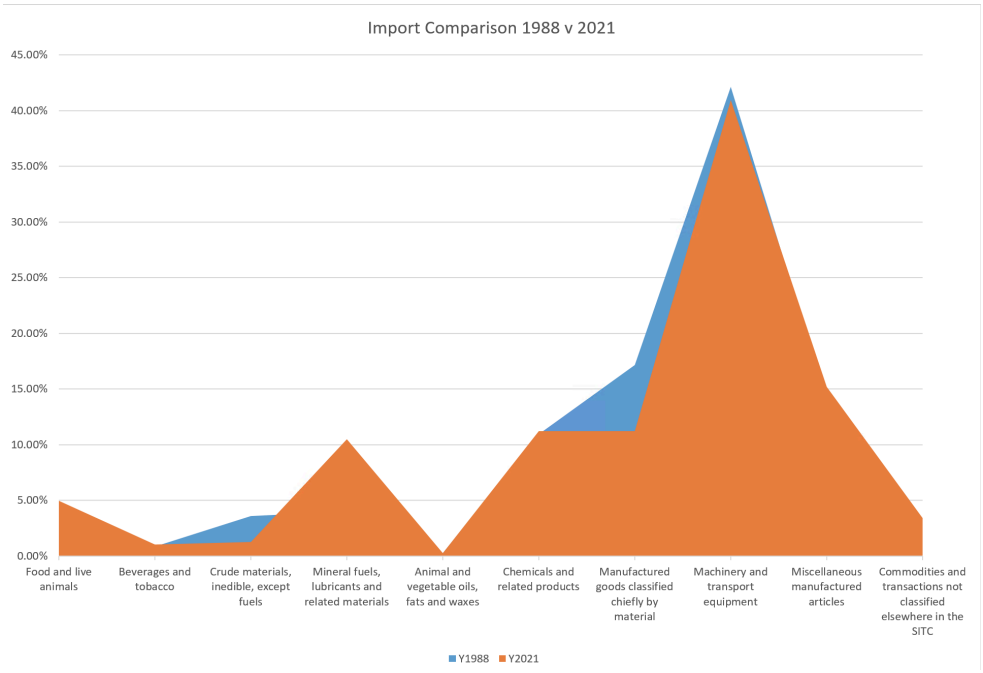


Figure 3: Import Comparison 1988 vs 2021

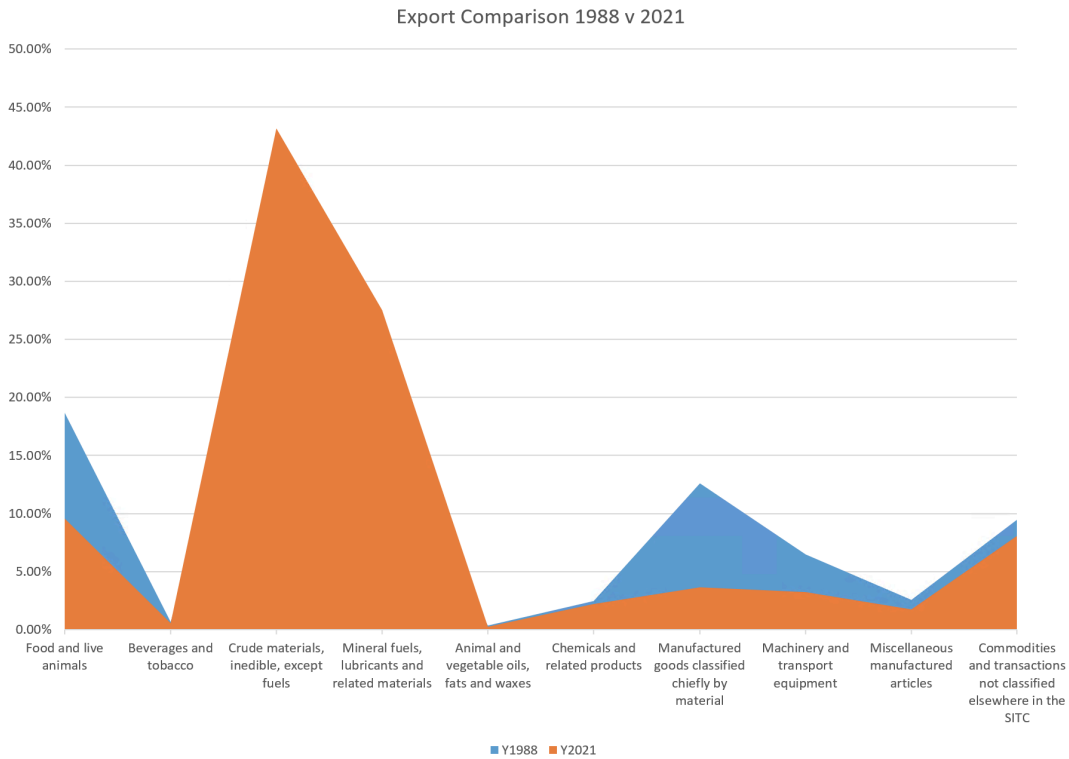


Figure 4: Export Comparison 1988 vs 2021

Dashboard

To further explore the machinery and transport equipment category, we will create a dashboard which will display information pertaining to its subcategories. The subcategories are as follows:

- 7.1 Power generating machinery and equipment
- 7.2 Machinery specialised for particular industries
- 7.3 Metalworking machinery
- 7.4 General industrial machinery and equipment, and machine parts
- 7.5 Office machines and automatic data processing machines
- 7.6 Telecommunications and sound recording and reproducing apparatus and equipment
- 7.7 Electrical machinery, apparatus and appliances, nes, and electrical parts thereof (incl. non electrical counterparts, nes, of electrical household type equipment)
- 7.8 Road vehicles (incl. air-cushion vehicles)
- 7.9 Transport equipment (excl. road vehicles)

The export of machinery and transport peaked in 1997 accounting for 13.35% of the total value of Australian exports. Since its peak, this value has declined significantly now only accounting for 3.23% of the total. In terms of imports, this category had a high of 47.09% in 1999 and has held consistently throughout the past 3 decades with an average of 42.65%

Creation of **dashboard 1**

- Format data in spreadsheet to include both export and import in the same sheet

First sheet in tableau (Machinery & Transport by Year)

- This is a simple line graph that looks at the total dollar amount of imports and exports combined
- It splits imports and exports into two distinct colours making it easy to discern the difference between the two
- The scale has been set to be equal for all sub-categories, an interval scale between $0 and $45,000 (million)

Second sheet in tableau (Machinery & Transport Text)

- Breaks down the categories imports and exports by year and its subcategories
- In the dashboard view, there is an option to toggle on and off imports and exports, as well as selecting a specific year to look at

Third Sheet in tableau (Total Export and Import)

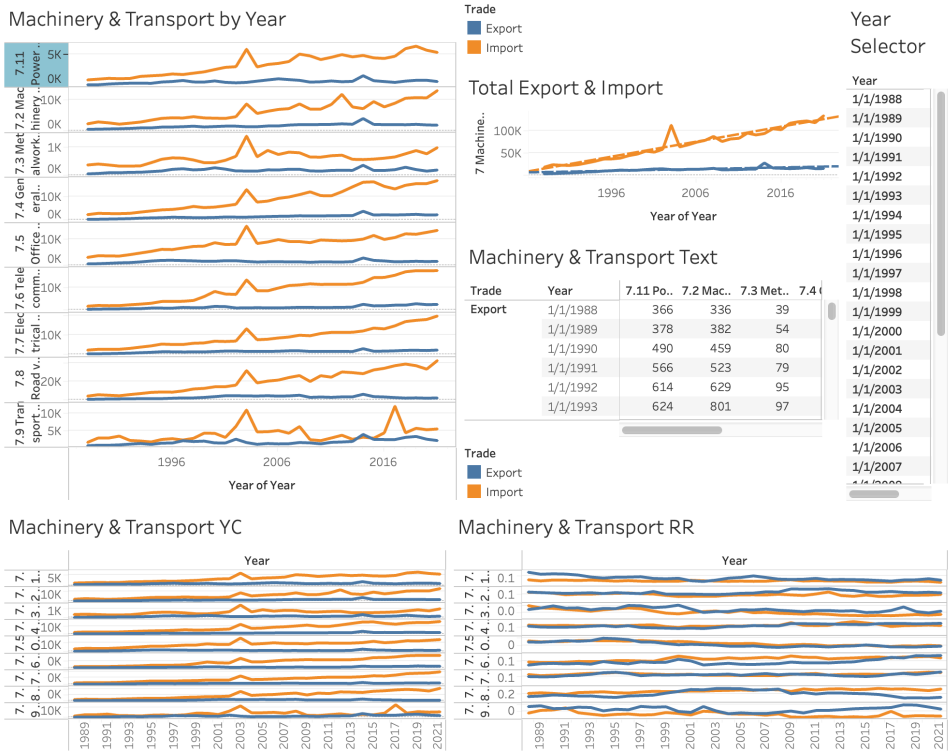
- Converted Year from text type to date type
- Created a line graph with the total export and import value for the entire category each year
- Additionally add in trend lines

Fourth sheet in Tableau (Machinery & Transport RR)

- Calculated the relative ratio for for each subcategory within the Machinery & Transport category
- Created a line graph showcasing the relative ratio changes for both exports and imports by year

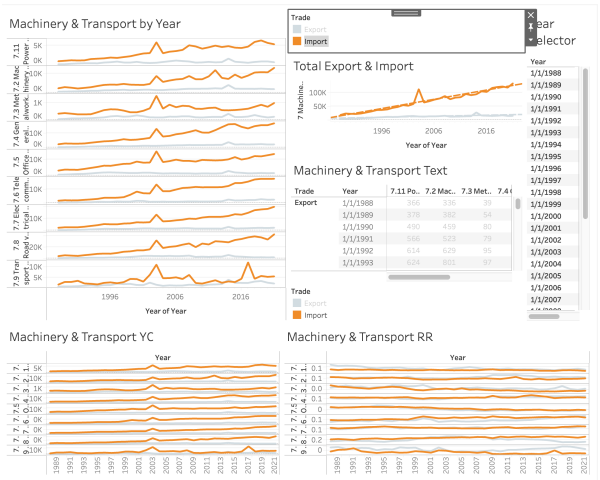
Fifth sheet in Tableau (Machinery & Transport RR)

- Calculated the yearly on year change for each subcategory within Machinery & Transport
- Created a line graph showcasing the year on year changes for both exports and imports

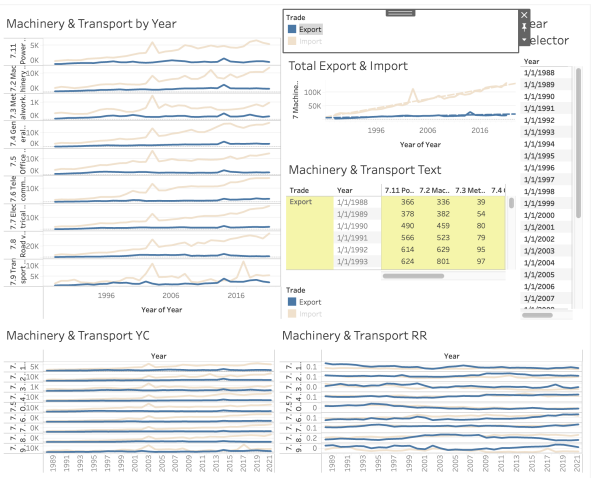


Dashboard 1: Yearly Changes

Included in this dashboard is the ability to switch between seeing exports and imports or both at the same time. This is achieved by toggling the desired icon under the trade icon. An example is shown below.



Exports Selected



Imports Selected

Dashboard 2

The second dashboard includes more detailed information regarding the ratios of each sub-category in relation to the main category.

Graph 1: Import Total $

- Look at the total dollar value of each sub-category.
- The largest contributor is located towards the top left.
- The colour is determined by the value of the dollar value, the darker colours represent larger amounts
- There are labels for both the values, names, and trade type (export or import)
- To ensure this tree graph only displays imports, I have utilised a filter to only include import data.

Graph 2: Export Total $

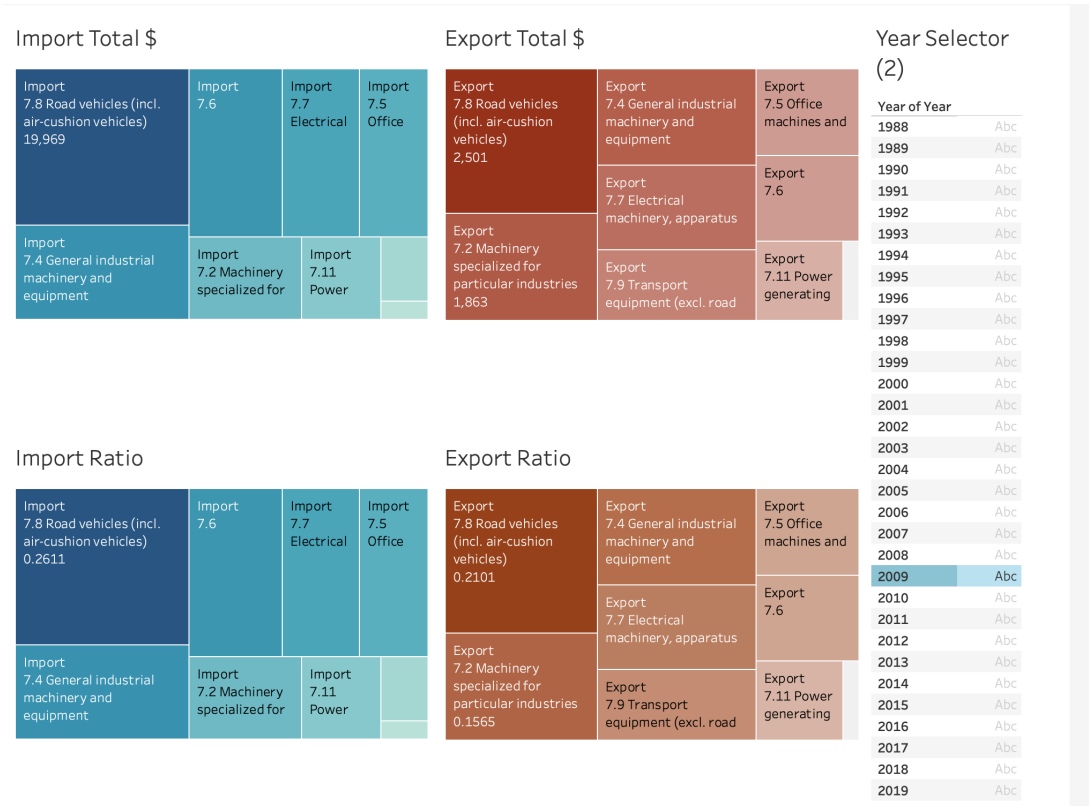
- This is a direct duplicate of the previous graph with the filter selecting export data
- Additionally, the colour has been changed to an orange shade to allow for a distinction between imports and exports

Graph 3: Import Relative Ratio

- This is a treemap showcasing the ratio of each import subcategory when compared as a whole against the main category

Graph 4: Export Relative Ratio

- This is a treemap showcasing the ratio of each export subcategory when compared as a whole against the main category



Dashboard 2: Detailed Import & Export View

There is an inclusion of a year selector, allowing you to clearly determine statistics from a particular year.

Storyboard

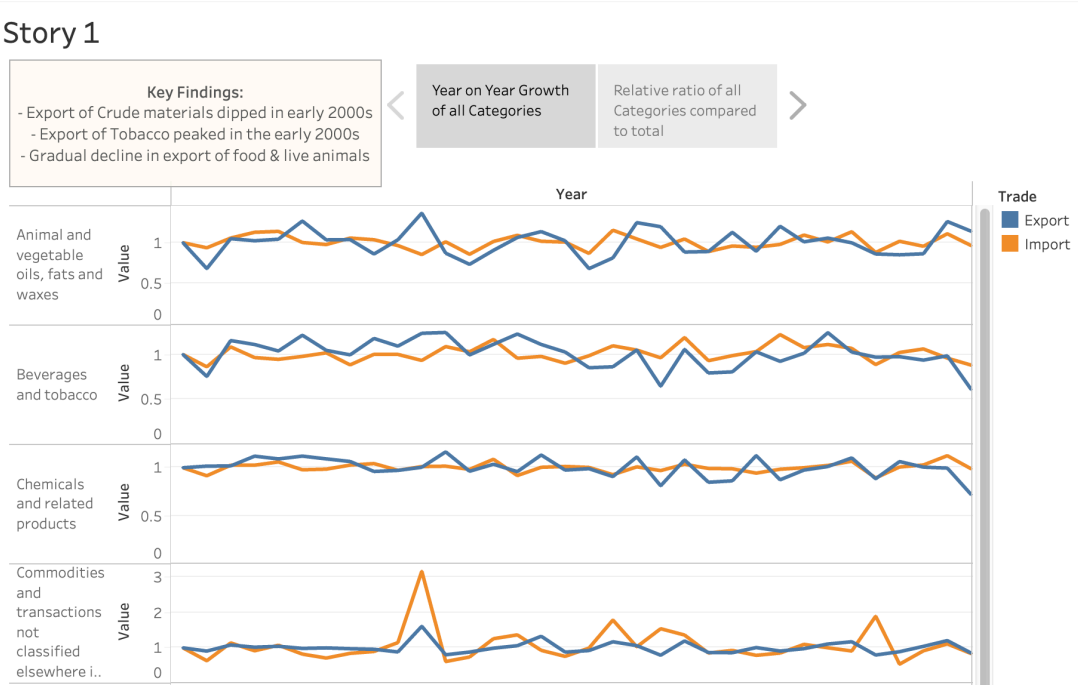
The first storyboard takes a look at all main categories, and consists of 2 story points.

Creation of Story Point 1:

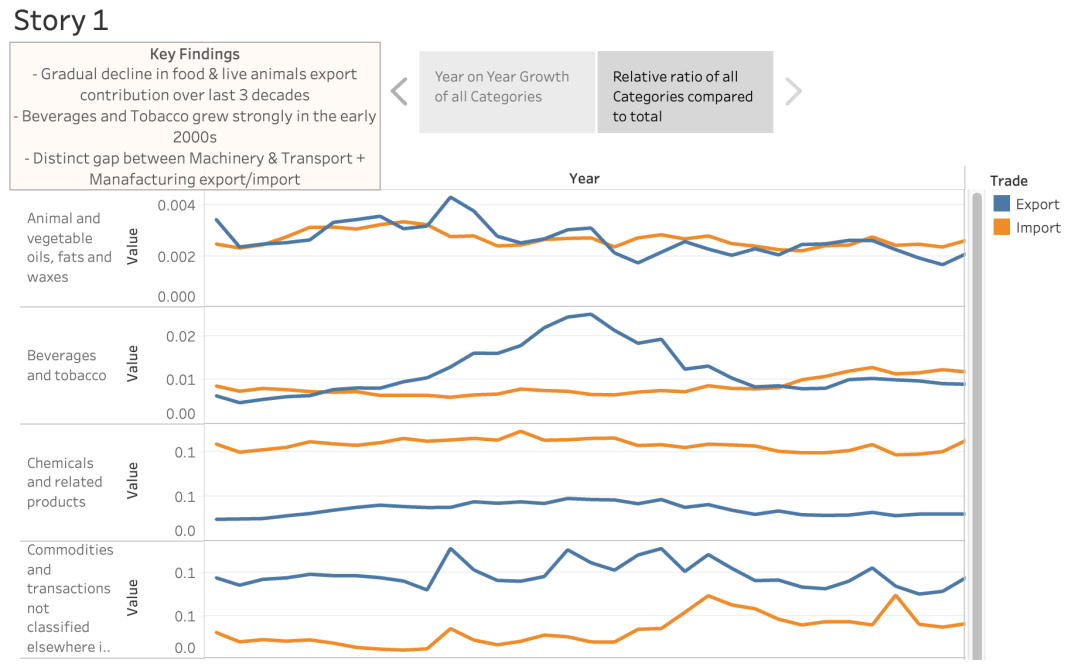
- Story point 1 makes comment on the major changes in regards to the total import and export categories
- The addition of key findings help the viewer quickly identify key trends in the data

Creation of Story Point 2:

- This story point looks deeper into the relative ratio of each main category compared to the total exports and imports for each year.

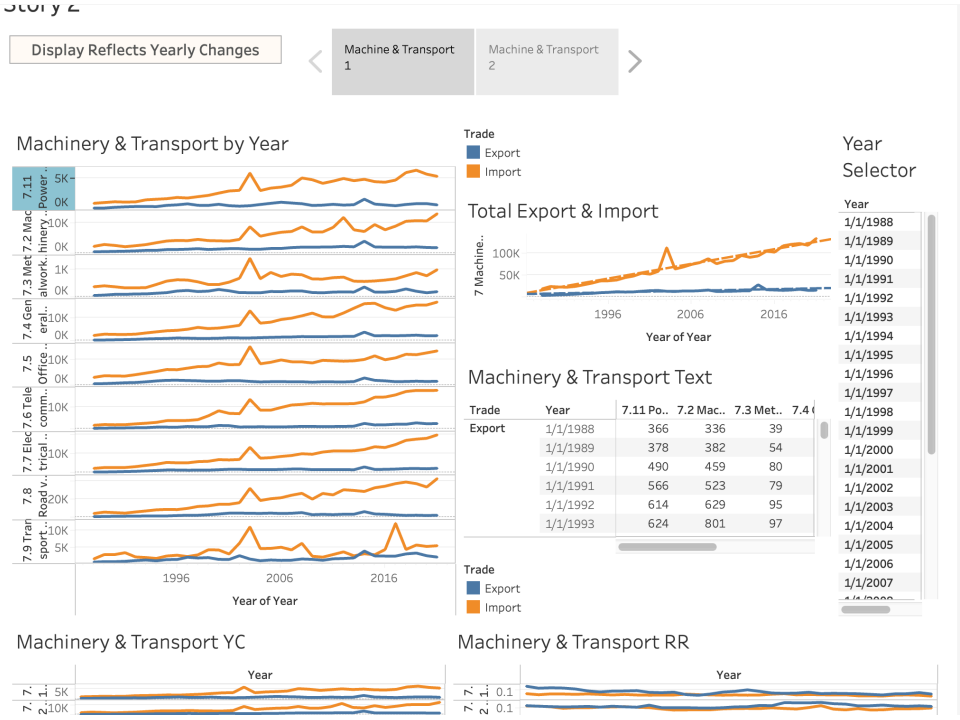


Storyboard 1: Year on Year Growth of all Categories

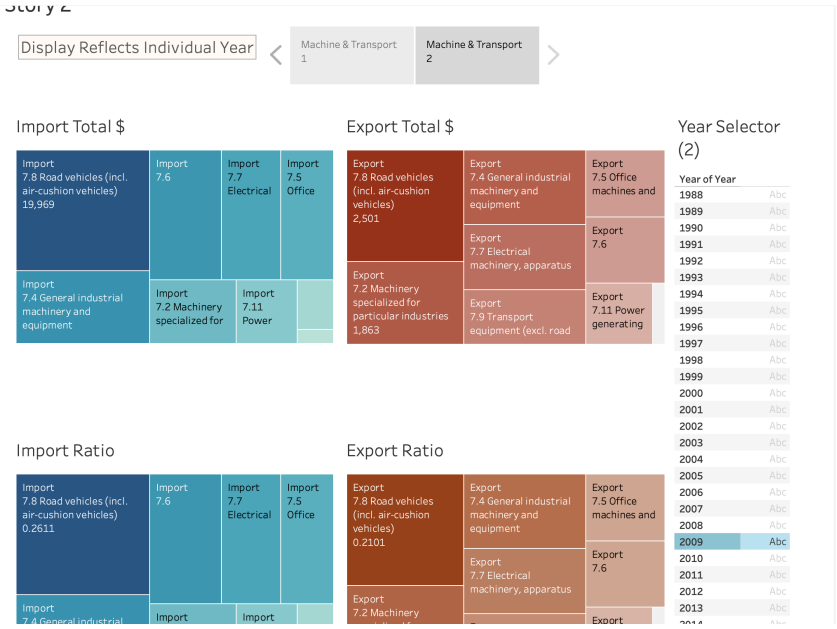


Storyboard 1: Relative Ratio of all Categories compared to total

The second story board delves into the category machinery and transport equipment category and its subcategories. This storyboard is shown below, and contains two separate story points.



Storyboard 2: Machine & Transport 1



Storyboard 2: Machine & Transport 2

Advantages and Disadvantages

Dashboard

There are a few distinct advantages when using a dashboard to represent data which were showcased in the examples above. Dashboards provide at a glance insights through their intuitive formatting, allowing for improved decision making. It is simple to spot trends over time, particularly when there is some form of year selector included such as in this case. Moreover, it is simple to share a dashboard to another individual without needing to provide elaborate context.
Utilising strong colours to segment export and import data allowed my dashboards to be clear to read and understand at a glance. Being able to select between data depicting exports and imports is a super useful tool that makes exploring the dashboard more intuitive.

As for the negatives of a dashboard, it can often be difficult to decide the critical information to include. This can also lead to a dashboard feeling ‘cluttered’ if too much unnecessary information has been included that does not add to the purpose of the dashboard.

Storyboard

Extending on from dashboards, the ease of sharing is a key characteristic of a storyboard. Typically there are a number of graphs and explanations throughout the storyboard contributing to a particular idea. This makes it an effective means to convey an idea in short form.

However, it can be easy to introduce bias as many storyboards can tend to ‘cherry-pick’ dates leading to confirmation bias. If a particular organisation wished to push a particular narrative then they could just include data that backed up their ideals. This makes it difficult to determine the authenticity of storyboards in many cases.

Interesting Findings

- In terms of relative ratios the export of crude materials dipped in the early 2000s before rising to a new high of 43% in 2021. This increase comes at the same time as China’s shift to globalisation and their rising middle class. It is likely that this directly led to this change in crude material exports
- The import of such materials has maintained at approximately 1% of total imports showcasing our non-reliance on importing such commodities
- Australia's export of tobacco hit a peak of over 20% in the early 2000s before declining rapidly accounting for less than 10% of total exports in 2021. This directly relates to increased taxes on cigarette sales and a general global public consensus that tobacco and other such substances are bad for you

- There has been a gradual decline of the contribution of the export of food and live animals from 20% to 10% in the last 3 decades. This reflects the increased desire of national independence with regard to important industries like food. Nations like those in Europe and Asia have increased their own growth of food and as such rely less on imports, resulting in a decline on Australia's export balance sheet. This change being reflected in the data
- The two most rapidly growing areas of machinery exports are telecommunications and electrical machinery, both of which have experienced rapid growth in recent years
- Australia's exports of transport vehicles (excluding road vehicles) has shown a tendency to outperform imports. This is likely to be a strong industry for Australia and should continue to bring large amounts of revenue into the country
- Interestingly, the export of road vehicles exceeded the import of road vehicles in the years 2000 to 2008. It began to fall drastically, before flatlining in 2018 roughly coinciding with the closure of Holden's production in Australia
- The largest contributor to the machinery and transport import segment is road vehicles, averaging close to 20% of the entire segment
- There was a huge spike in the total export of machinery and transport during the years 2002 and 2004. It went from $58,859 million to $113,653 million the next year
- There was also a spike in the import of machinery and transport segments during the years 2014 and 2016. This comes directly after a series of declines in the export of this segment. Thus showcasing perhaps an inability to continue to cater for international and domestic demand simultaneously