Global Electric Vehicle Trends

Analysis for the Australian Electric Vehicle Association

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Definitions & Scope

An Electric Vehicle (EV) is a vehicle that uses one or more electric motors

Two popular types of EVs:

- **BEVs** (Battery electric vehicles)
- **PHEVs** (Plug-in hybrid electric vehicles):

For this analysis, both BEVs & PHEVs have been used. Insights are drawn from EV cars, trucks, busses & vans.

Data included:

EV sales & charging point data for 30 countries (IEA) from (2010-2021) - with six focus countries:

- Australia
- China
- UK
- USA
- France
- Germany

World Bank GDP information

EV Incentive information

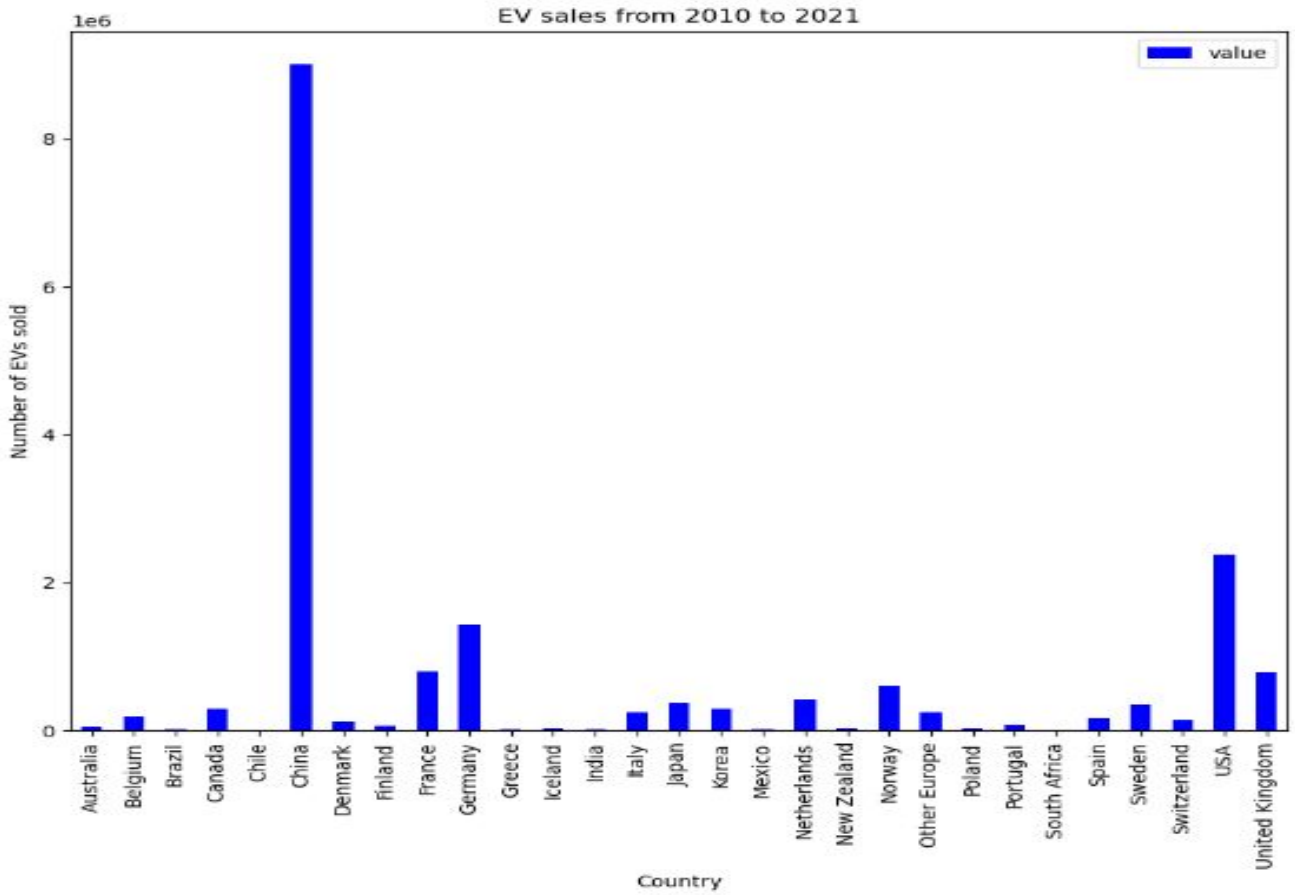
Hypotheses

1. **Countries with smaller GDP will have fewer EV sales, as a trend**
2. **Readily available and rewarding incentives will drive EV sales**
3. **COVID-19 has slowed EV sales**

Research Questions

1. What are the recent trends of EV sales? Has COVID-19 affected these trends?
2. What is the relation between a country's GDP and EV sales? Is Australia on trend?
3. Do government incentives result in more EV sales?

EV Sales Trend



Understanding China's dominance in the EV space -

China's State Council plan (2020) includes a goal to reach 20% penetration of new energy vehicles by 2025.

Source: *China's EV market exploded in 2021 with a record 3 million sales - Protocol*

EV sales trends

EV sales trends

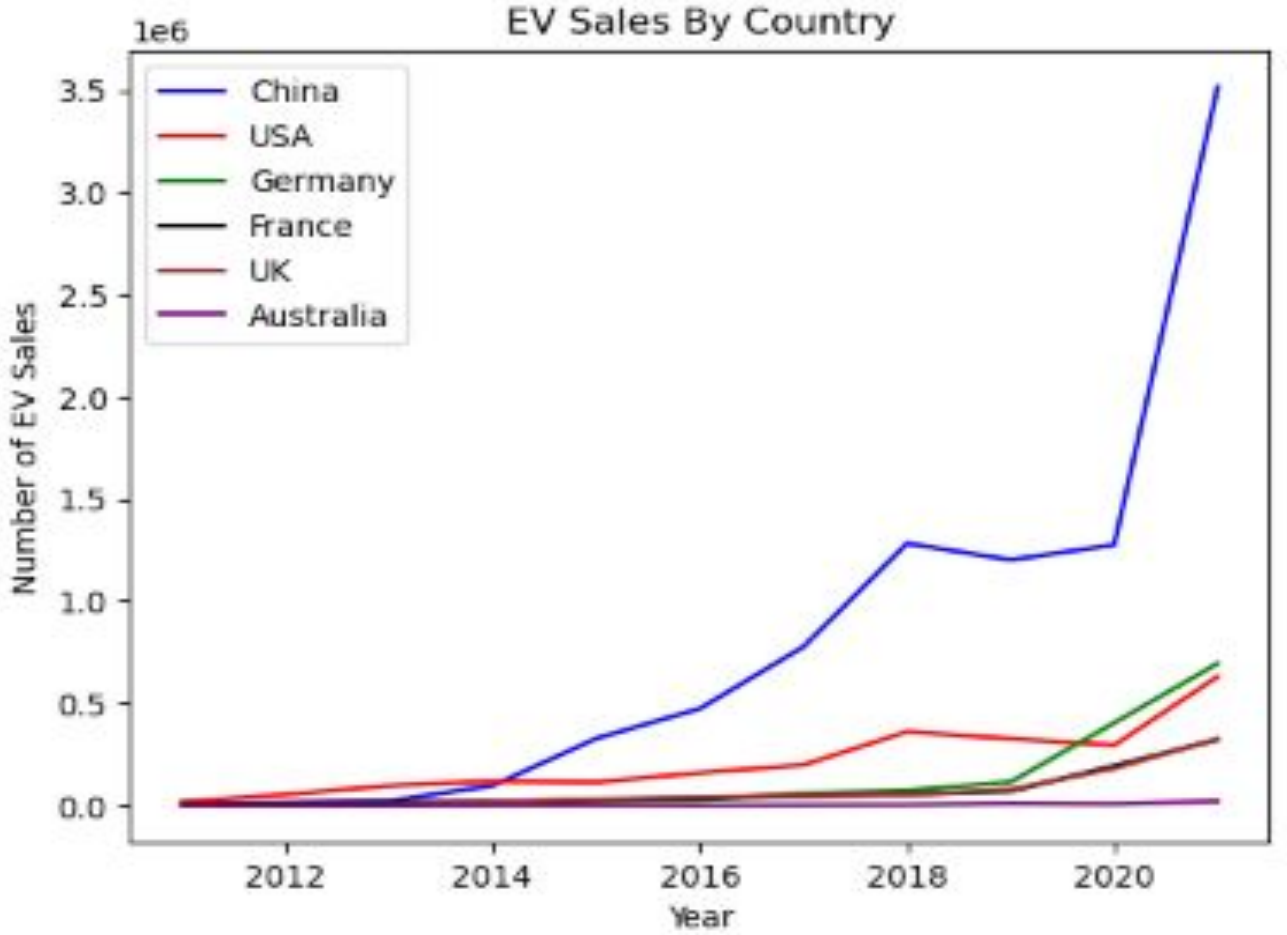
From 2010 - 2021, China had the biggest EV car sales of 8.9 million cars

Other large EV markets were:

- USA (2.3 million cars) - the second largest, nearly 4 times less than China’s
- Germany (1.4 million cars)
- France (0.8 million cars)
- UK (0.78 million cars)

Australia was recorded a small number of EV sales of 47,000

EV Sales Trends

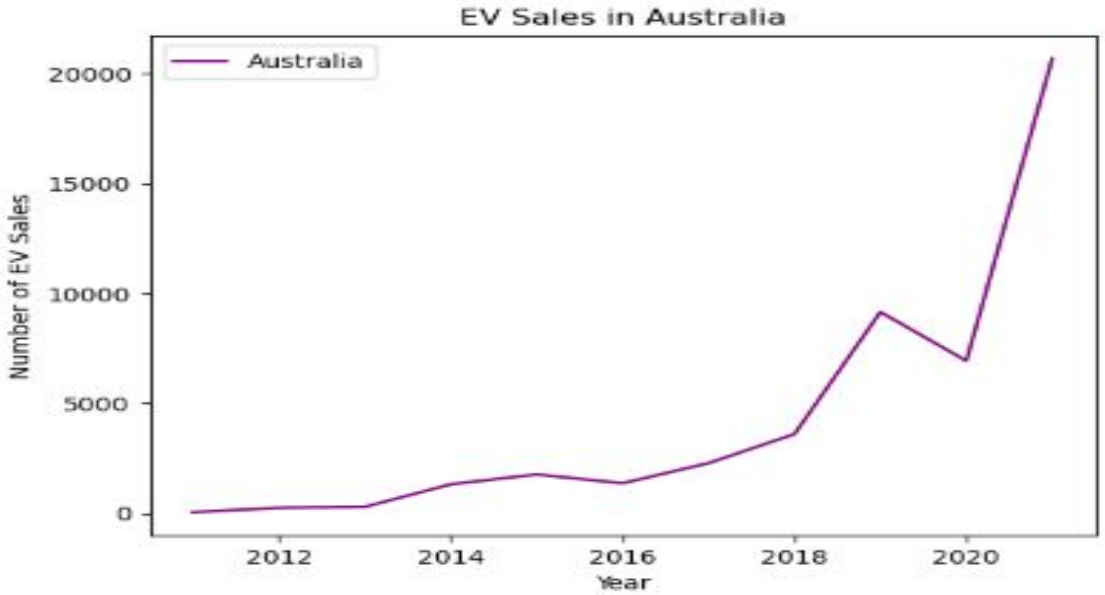


EV sales trends

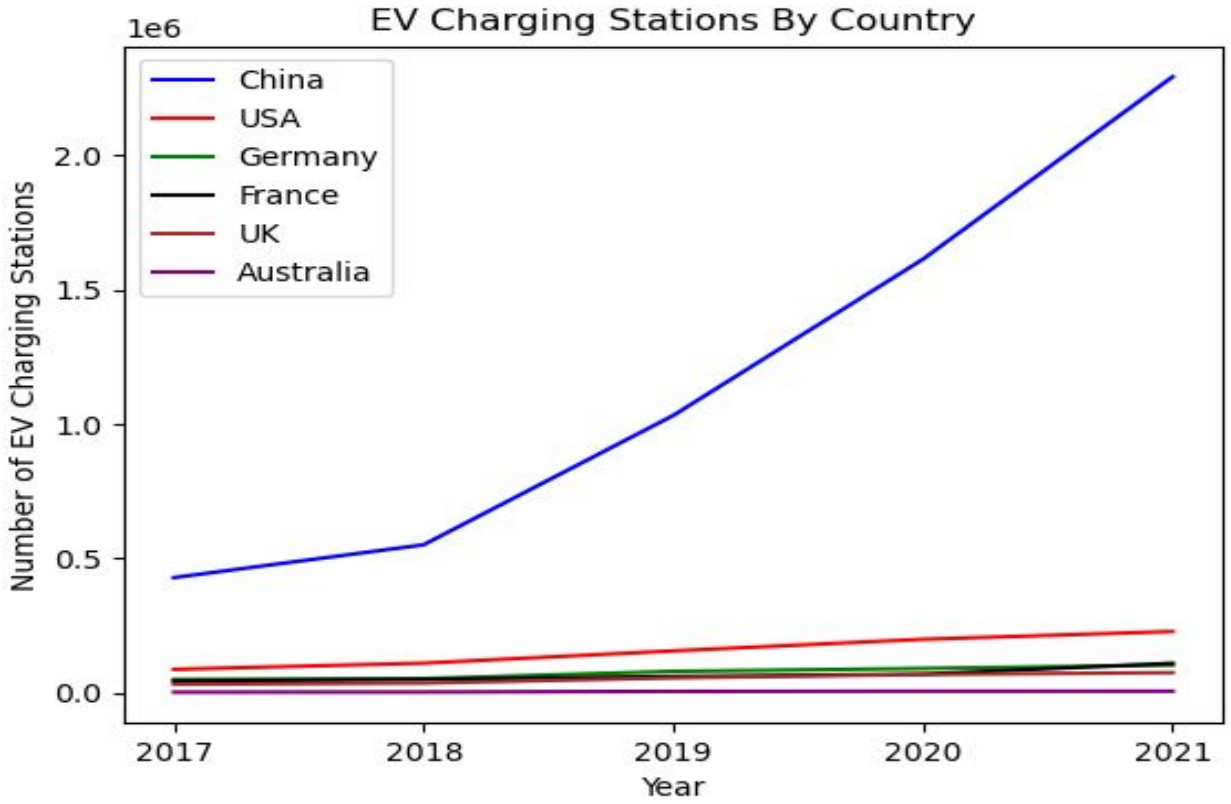
- From 2011 to 2018, sales increased in all 6 selected countries
- From 2018 to 2020, sales in China and USA slightly decreased
- (Likely because of Covid 19 effect)
- From 2020 to 2021, sales rose dramatically, especially China (from 1.3 mil in 2020 to 3.5 mil in 2021)

EV Sales Trends - Australia

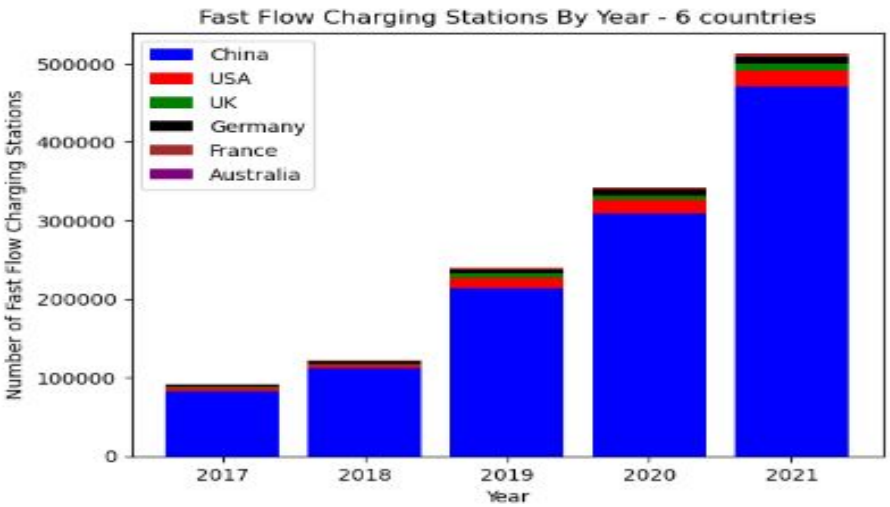
- Dropped during Covid 19
- Increased from approx 9,000 in 2020 to 21,000 in 2021 (representing 133% growth)

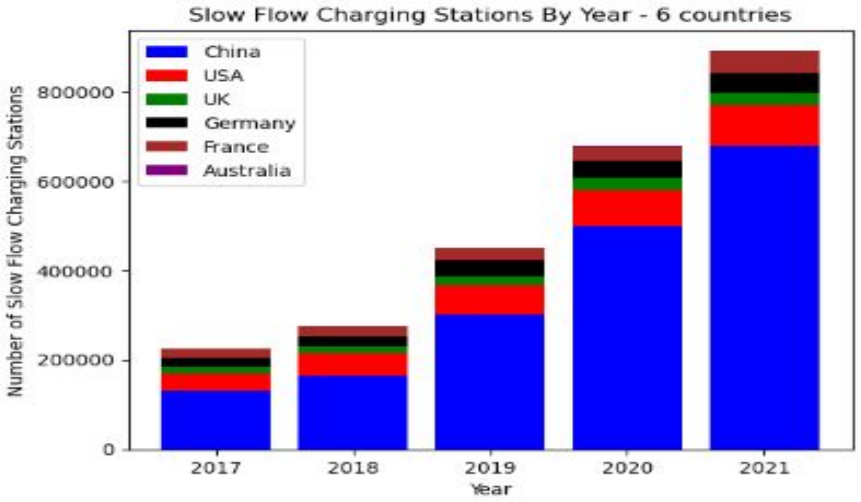


Charging Stations Trends



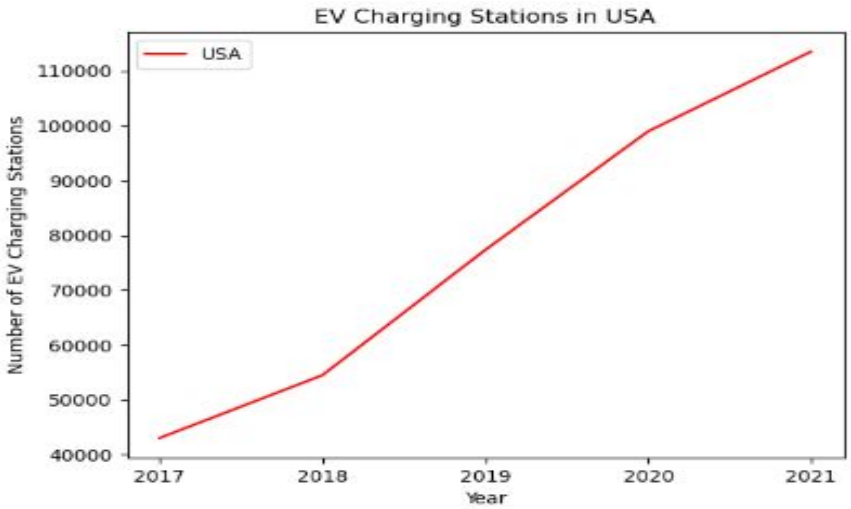
Investment in Charging Stations

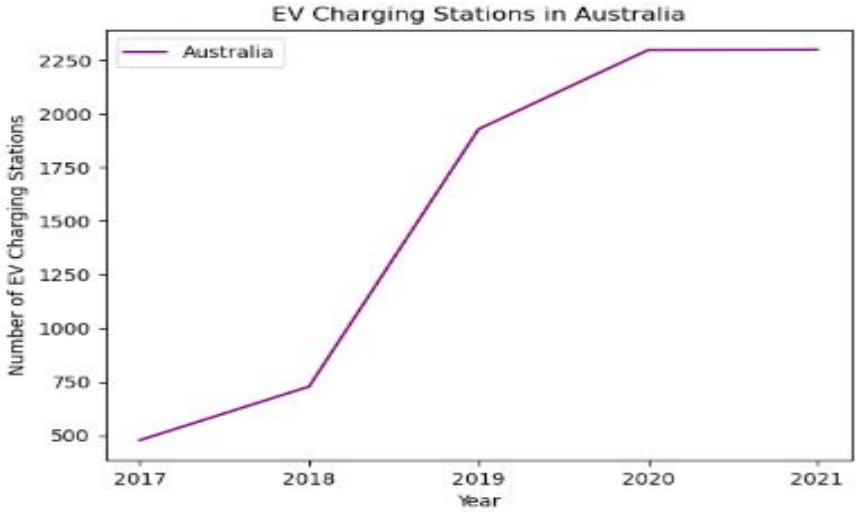




Investment in Charging Stations

Australia has had no significant new charging station investment 'post-COVID'

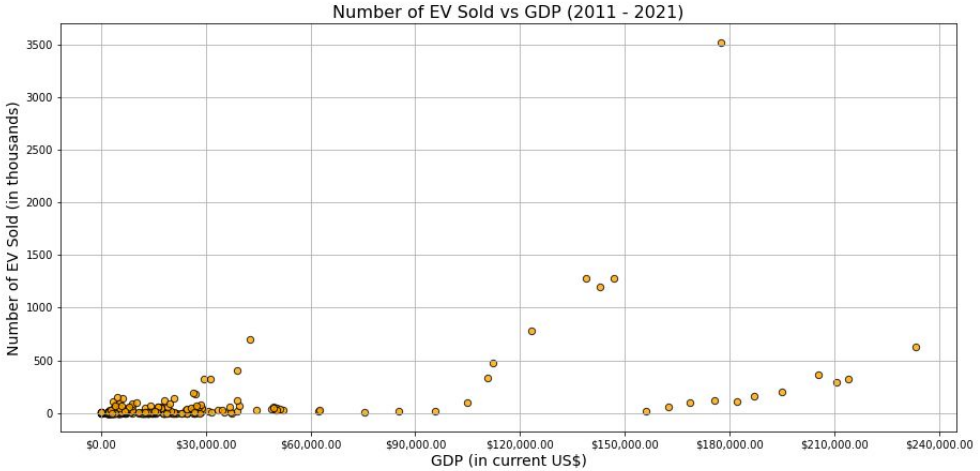




Does GDP Impact the Number of EVs Sold?

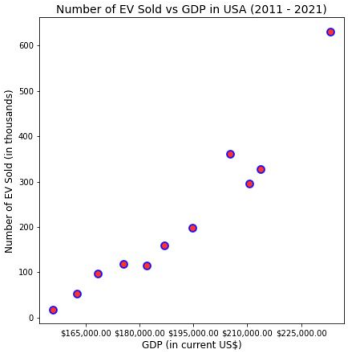
Tools

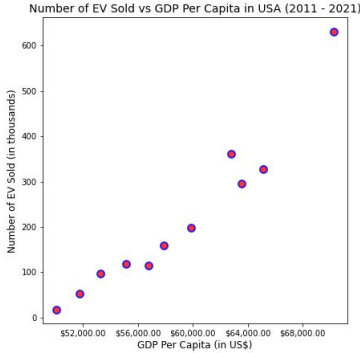
- Python / Jupyter Notebook
- wpgapi - World Bank API package
- ScatterPlots
- Correlation Coefficient - *lin_regress*

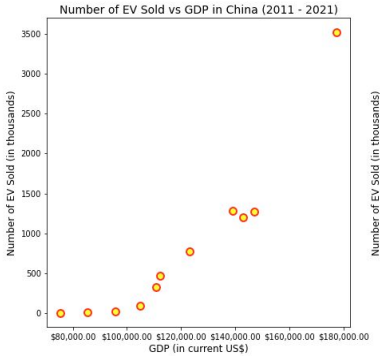


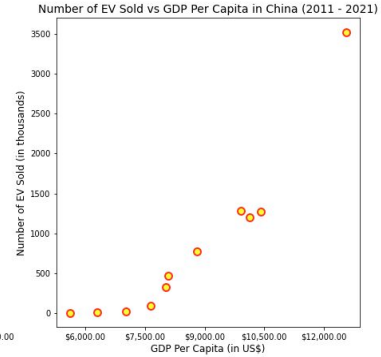
Findings

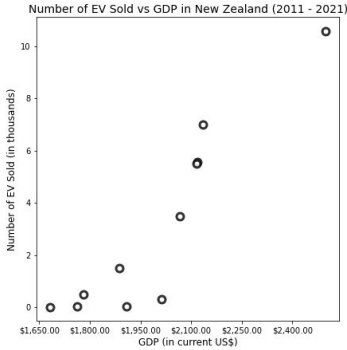
GDP vs GDP Per Capita

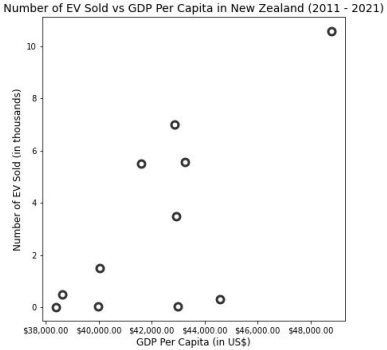


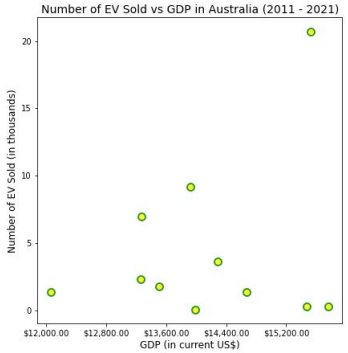


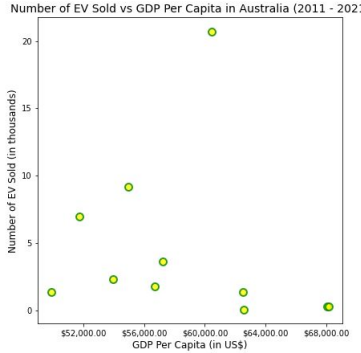






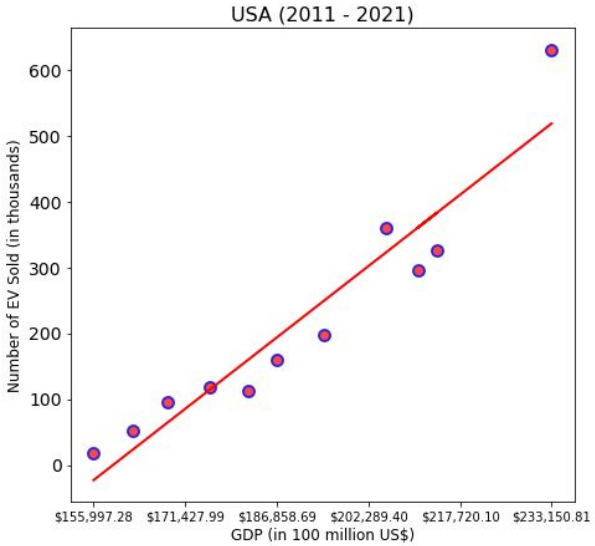




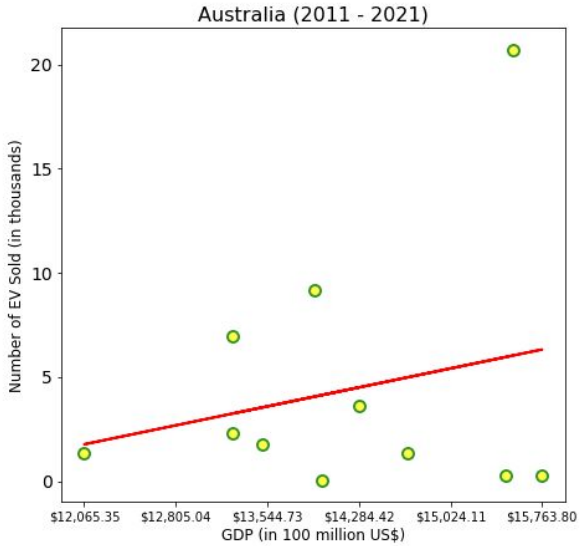


Findings cont.

GDP



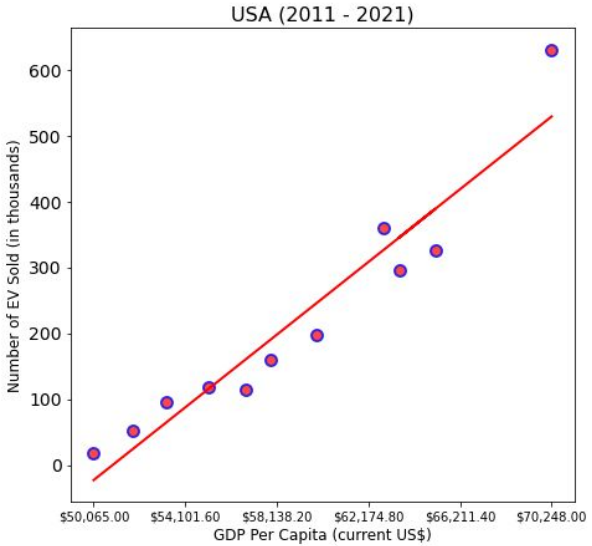
r-value = 0.94951



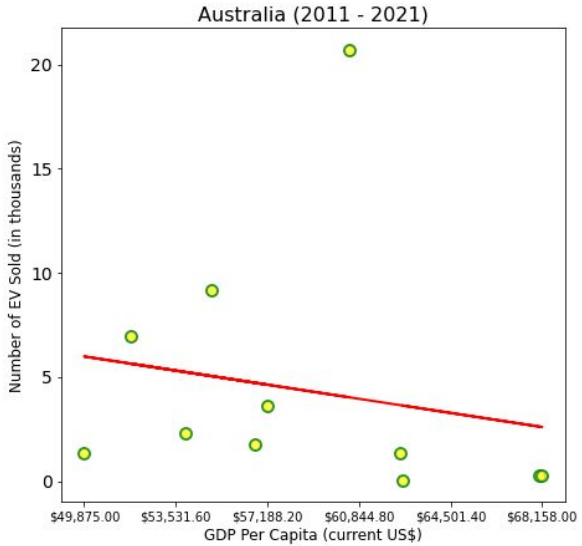
r-value = 0.22743

Findings cont.

GDP Per Capita



r-value = 0.95638



r-value = -0.18535

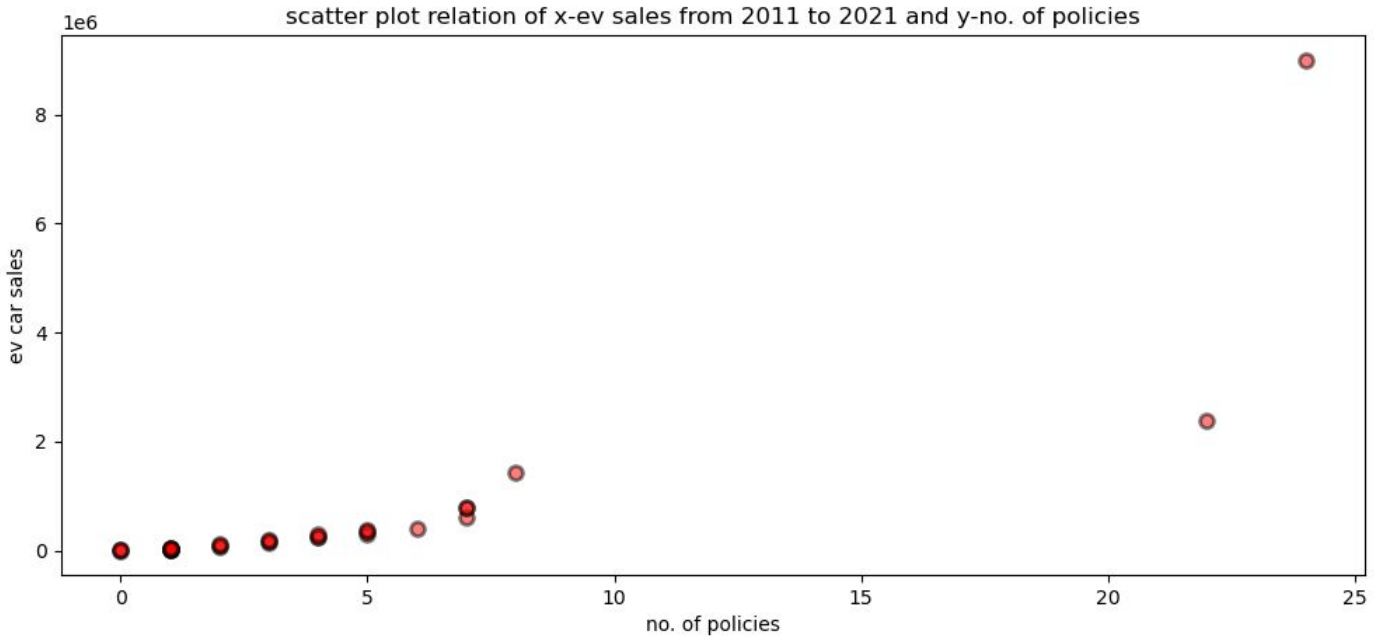
So…

Does GDP Impact the Number of EVs Sold?

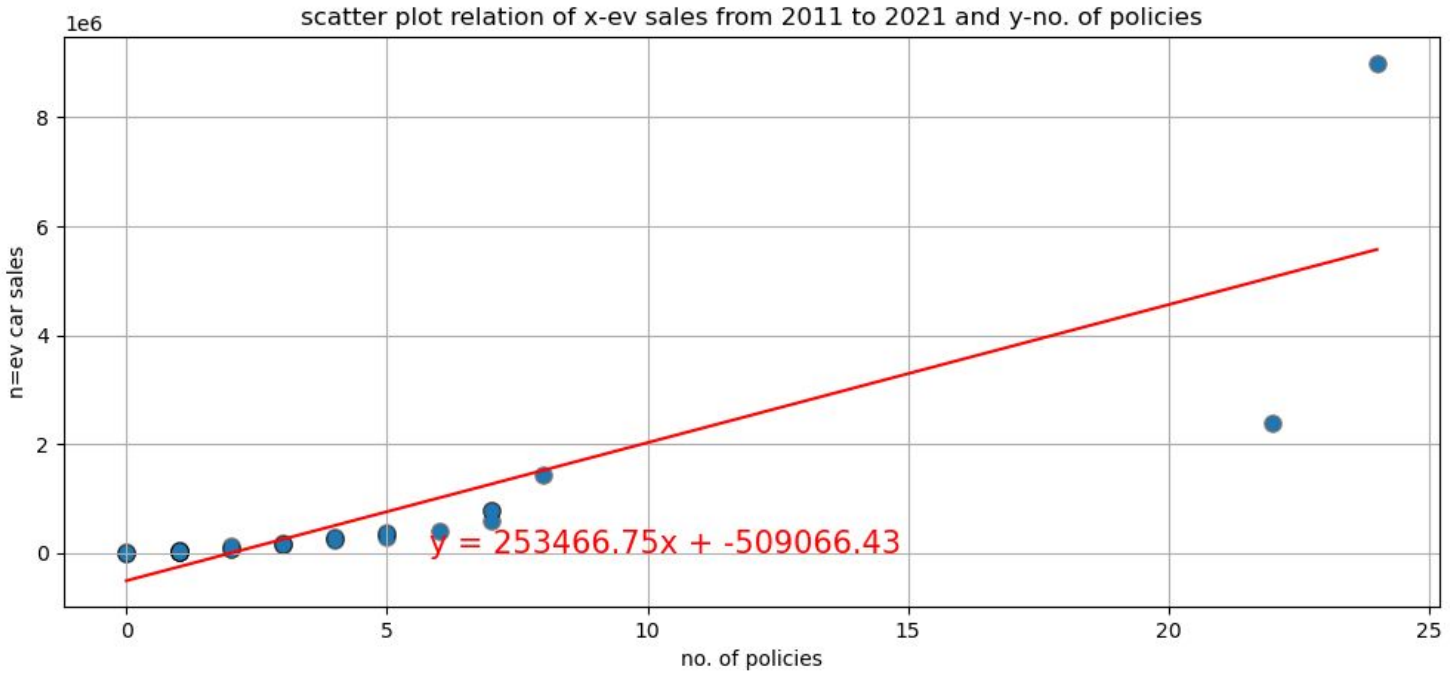
- Yes and No
- correlation does not imply causation
- Need more data

Policies effect on global ev sales

Scatter plot no. of policies implemented vs ev cars sold



Correlation between ev sales and no. of policies



r=0.845

Conclusions

- Australia has had slow EV uptake compared to other nations even when taking population into account
- There is no investment in the charging stations by the Australian government after the covid, but during this other government like USA has invested, leading Australia lagging in EV use.
- Countries like USA and China have strong positive correlation of with R- values of 0.956 and 0.923 between the Number of EV Sold and GDP Per Capita suggesting that as GDP Per Capita Increases, the number of EV sold also increases.
- In contrast to USA and China, Australia have weak and negative correlation with R- value of -0.185, this means as the GDP Per Capita increases, the number of EV sold decreases..
- Correlation doesn't imply causation, and other factors may also affecting the EV sales in these countries.

Limitations

- Sales trend data has not been standardised by population (absolute trends only)
- Data is only currently available for countries who are members of the IEA (30 countries) , with World Bank EV data pending release. Further analysis should be conducted once more information is available
- Incentive information is complex to compare/quantify across policies
- EV cars are considered more expensive than petrol or diesel-engine versions of the same car - meaning that EV cars are not available for the full population
- A further avenue of exploratory analysis should be the availability of charging stations in Australia, as distance between stations may be a limiting factor for EV sales in AUS.


Thank you.