**The impact of Commodity Prices on Housing Prices**

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## **Why Commodity Prices and Housing Prices?**

Our team looked at available iron ore price data and cross-referenced it with publicly available data related to housing prices to determine if there is an increase in iron price with increase in housing price. We have looked at two capital cities Perth, which lies in state WA rich in iron ore to the complete opposite Sydney, which lies in state NSW which is more service oriented state. We have extracted the data from year 2008 to year 2018 based on our data availability.

**Null Hypothesis:** There is no correlation between iron ore price and housing price.

**Alternative Hypothesis:** There is a correlation between iron ore price and housing price.

## **Research Questions**

1. Is there increase or decrease in housing prices over the years?
2. Is there increase or decrease in commodity prices over the years?
3. Is there variation between Perth and Sydney?
4. Is there a correlation between housing prices and commodity prices?

# **Data Sources**

* Perth Housing Prices dataset was located on Kaggle and downloaded as a csv:

<https://www.kaggle.com/syuzai/perth-house-prices/version/3>

* Sydney Housing Prices dataset was located on Kaggle and downloaded as a csv: <https://www.kaggle.com/mihirhalai/sydney-house-prices>
* Iron ore data was downloaded as excel file from Market Index and saved as a csv file

<https://www.marketindex.com.au/iron-ore>

# **References**

* <https://thepropertytribune.com.au/industry/how-much-do-commodity-prices-impact-property-prices/>
* <https://thepropertytribune.com.au/data-insights/property-values/australian-house-prices-rose-by-221-during-2021/>
* <https://www.rba.gov.au/publications/bulletin/2015/sep/4.html>

**Strategy and Metrics**

**Definitions:**

* Housing Prices: Average Housing Prices
* House – 4 Bedroom and 2 Bathroom houses
* Iron Ore Price: Average Iron Ore Price in USD
* Location: Perth, WA and Sydney, NSW
* Timeframe: focus on 2008 to 2018 quarterly based on data availability

**Data Retrieval:**

We downloaded the Perth Housing Prices and Sydney Housing Prices dataset as CSV file from Kaggle whereas the iron ore dataset was downloaded from Market Index in excel file and saved as CSV file.

We didn’t know the validity of the data as both housing data sets were released by Kaggle users the web scraped from realestate.com.au for Sydney Data and from <http://house.speakingsame.com/> for the Perth house prices. This has led to some of the data being incomplete especially in the earlier years which can be seen in the variation in Perth data prior to 2009. The reason we stuck with this data is due to the cost with the data being able to provide some insight even with its flaws. Our recommendation if further analysis was required would be to use core logic for house prices over the years as the data is more complete and the fact the even the ABS use them for house data does help with the trustworthiness of the data. The reason we did not use core logic was due to the cost to get data

**Assemble and Clean the Data:**

Once we had the data sets we removed any missing data and converted the data into quarterly data to smooth out the data as to prevent some months only having one data point skewing charts. Then averaged the quarterly price of the commodities to get the change from quarter to quarter. From there we selected certain parameters we wished to measure, those being date, quarterly iron ore average price, house price, number of bedrooms, number of bathrooms and postcode. The reason for selecting bedrooms and bathrooms was so that once the data is all combined we can determine the most popular house type. This ended up being four bed two bath at over 54000 houses sold even though three-bedroom homes are more popular overall. From here we removed outliers from the data by using the quartiers method. After selecting our control variable as four bed two bath we began our analysis

**Trends and Analysis**

Iron Price Trend

* The iron price was around $60 in 2008 and within three years (i.e. 2011) had soared to almost $180. The price fluctuated after 2011 and dropped significantly to below $60 by 2015. The price stabilised after 2015 with slight rise until 2018.

Housing Prices Trend

* Perth: There seems to be drop in house price during 2008 Price started increasing after 2008 and reached to high point of above $850k. Price continued to drop from 2011 and fluctuated further with slight increase and decrease
* Sydney: Price started decreasing from 2008 and plummeted in 2009. Price increased from 2009 further and skyrocketed above $1.2 million. By 2018, price dropped slightly but still above $1 million.
* While obtaining the variation in two cities, it is evident that the house prices in Sydney are higher than in Perth and have plunged in 2008 in both cities. From the start of 2012, prices in Perth slightly decrease over time with a few fluctuations whereas it seems to increase gradually in Sydney

Correlation Analysis

* Pearson’s Correlation Coefficient was calculated for each city.
  + Perth: .42, which indicates there is moderate positive correlation between iron prices and house prices in Perth
  + Sydney: -.46, which indicates moderate negative correlation between iron prices and house prices in Sydney.
* We analyzed normal distribution for iron ore price and house prices in Sydney and Perth which showed they were not normally distributed as bell shaped graph couldn’t be formed
* Independent t-tests were run, however the assumptions for the datasets (data is normally distributed, independent, and homogenous (the standard deviations are roughly equal)) are not true. But, p value for t-test between iron ore price and Perth house prices and t-test between iron ore price and Sydney house prices are below 0.05 which shows the evidence in support of alternative hypothesis.

**Conclusion**:

* House prices are higher in Sydney than in Perth
* While housing prices increased with iron ore price in Perth, the case is opposite in Sydney however the two cases showed a moderate correlation
* From test of t-test we rejected the null hypothesis and accept that there is a correlation between iron ore prices and housing prices
  + *this could be due to higher iron price allowing mining companies in WA to pay workers more enticing than those in other states to move over thereby putting pressure on housing market.*
  + *Likewise, if residents are leaving Sydney for higher pay positions, that takes off pressure on housing market in Sydney.*