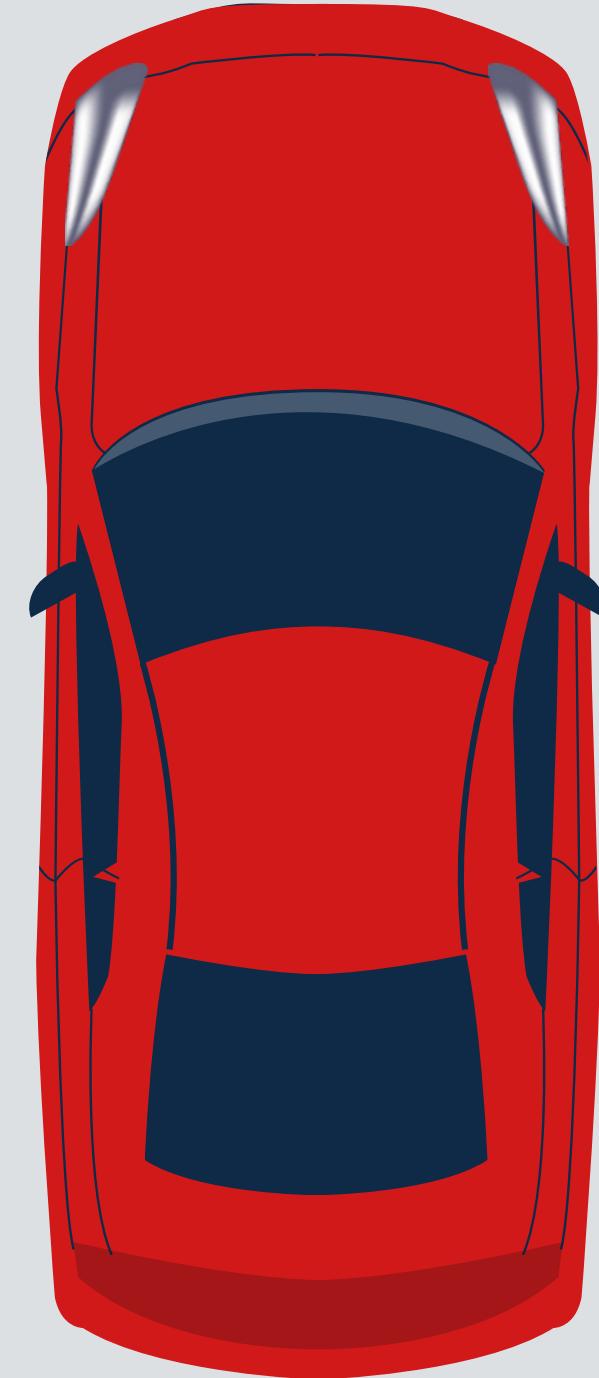




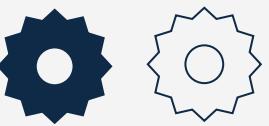
# Let Us Sell Your Car

A Data Analysis on CarGuru's Car Inventory Data



Jessica Gallardo, Shu Teng Ong, Chloe Roque





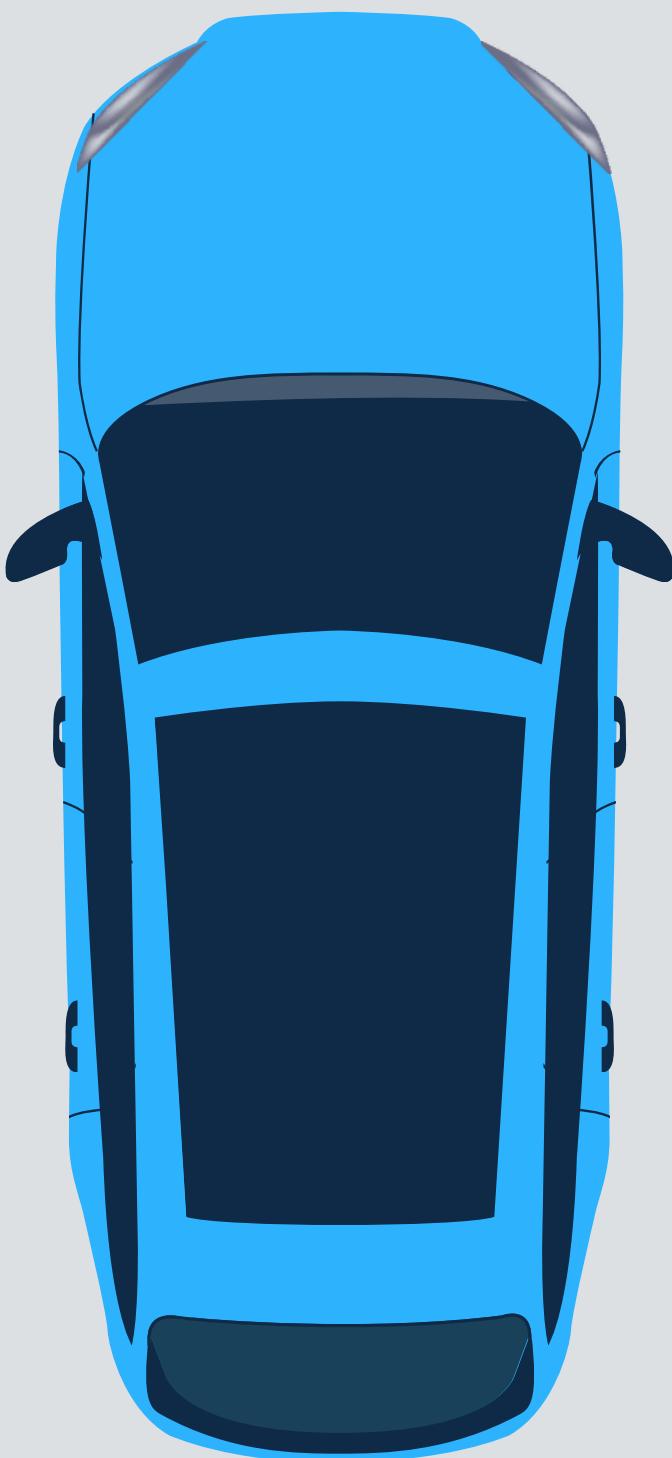
# Overview

- Data Summary
- Data Analysis
- Machine-Learning
- Conclusion



# Data Summary

- CarGuru 2021 Inventory
- 217k Rows & 60 Columns
- Example features:
  - Make & Model
  - Age
  - Mileage
  - Condition
  - Vehicle History

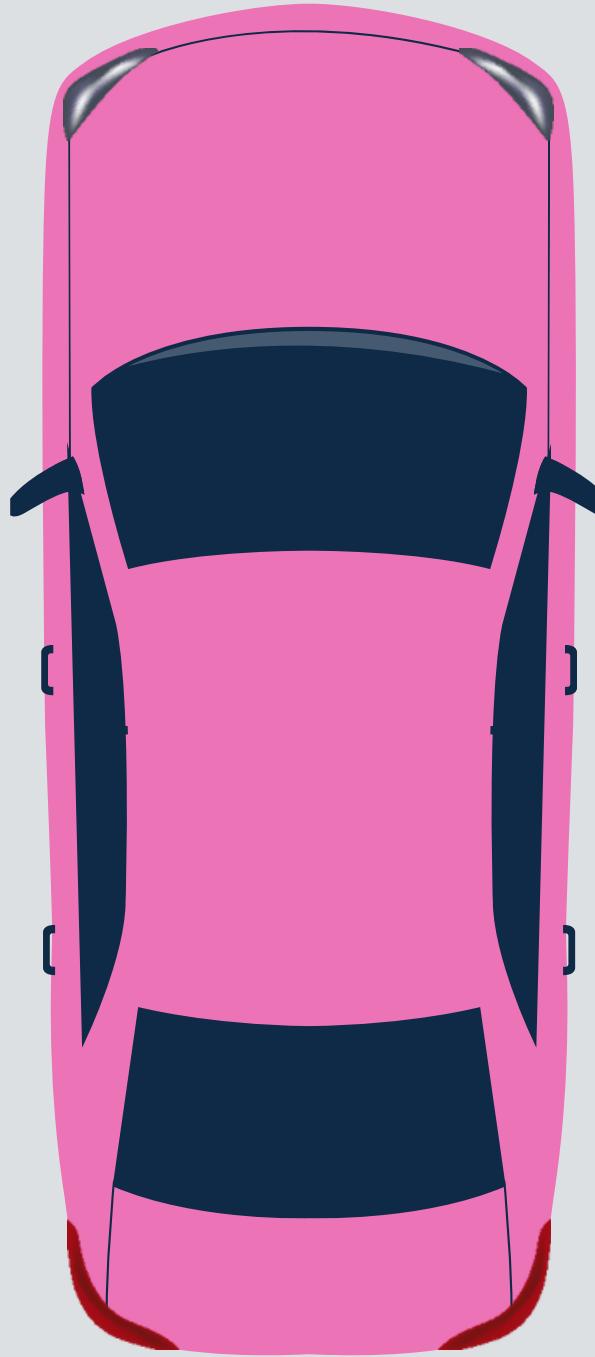




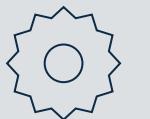
RQ:

**What features influence car prices?**





# Data Analysis: Price



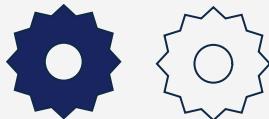
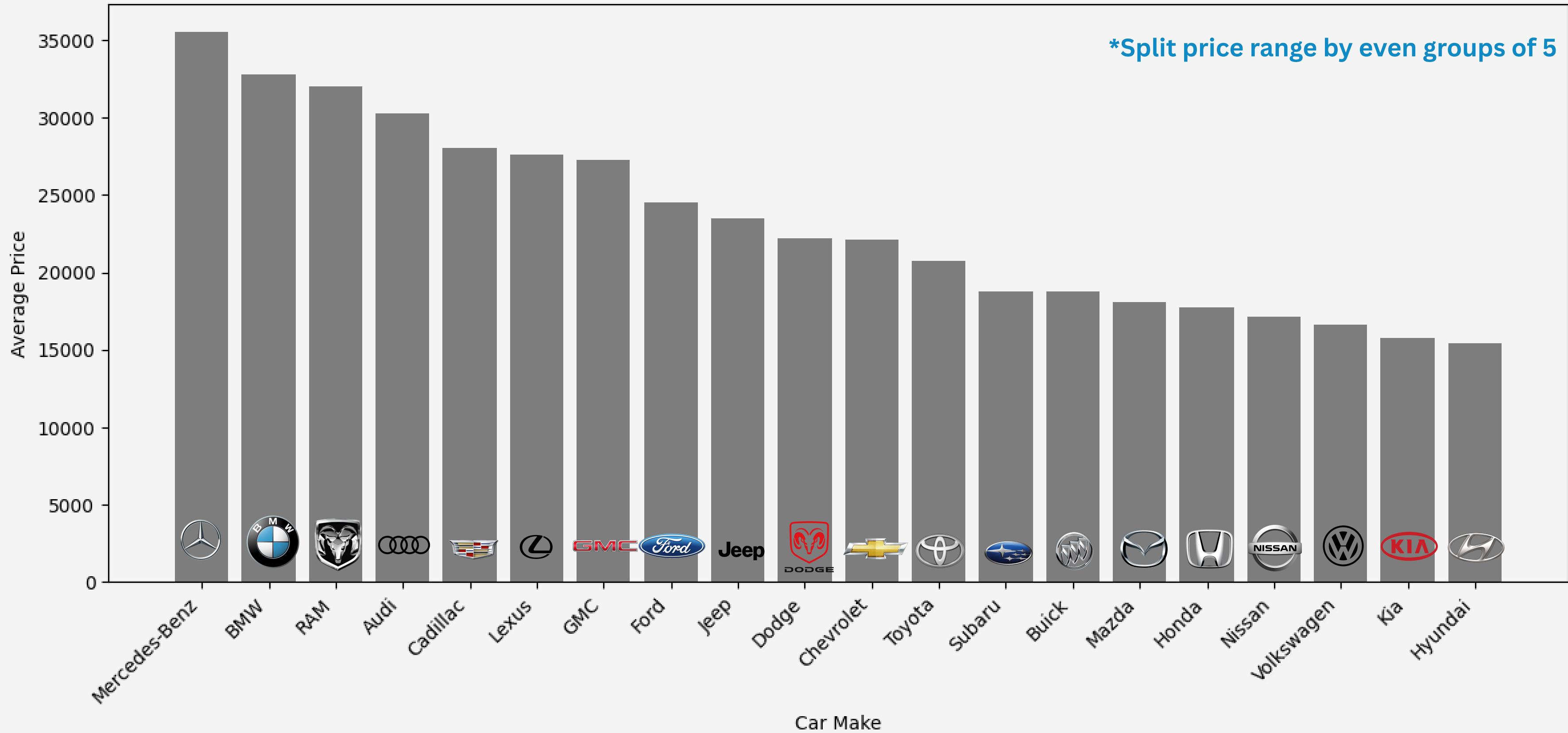


## TOP 20 CAR MAKES

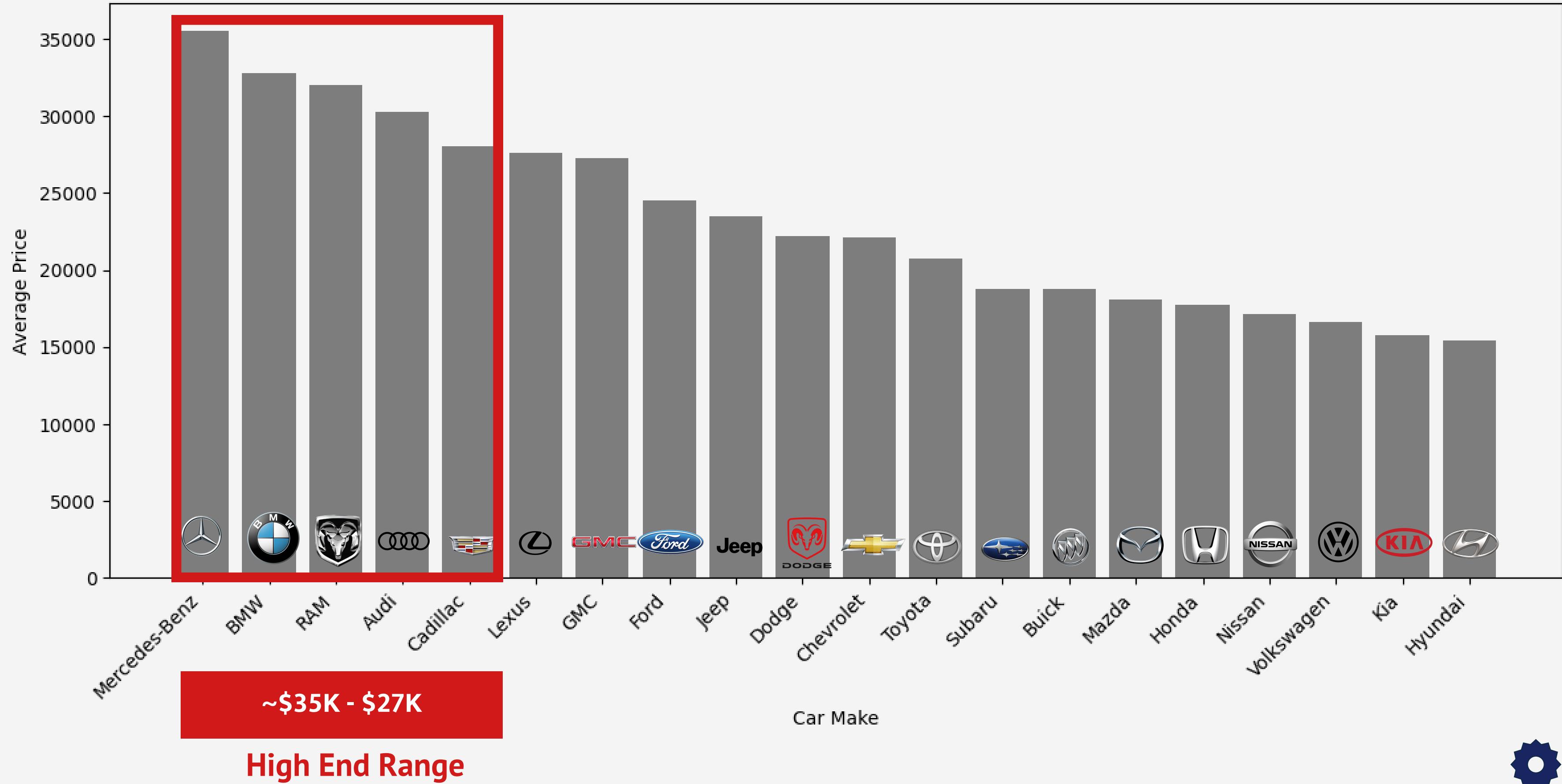
**90% of our data** is the accumulation of the **top 20 car makes**, while the other **10% of our data** is **33 other car makes**.



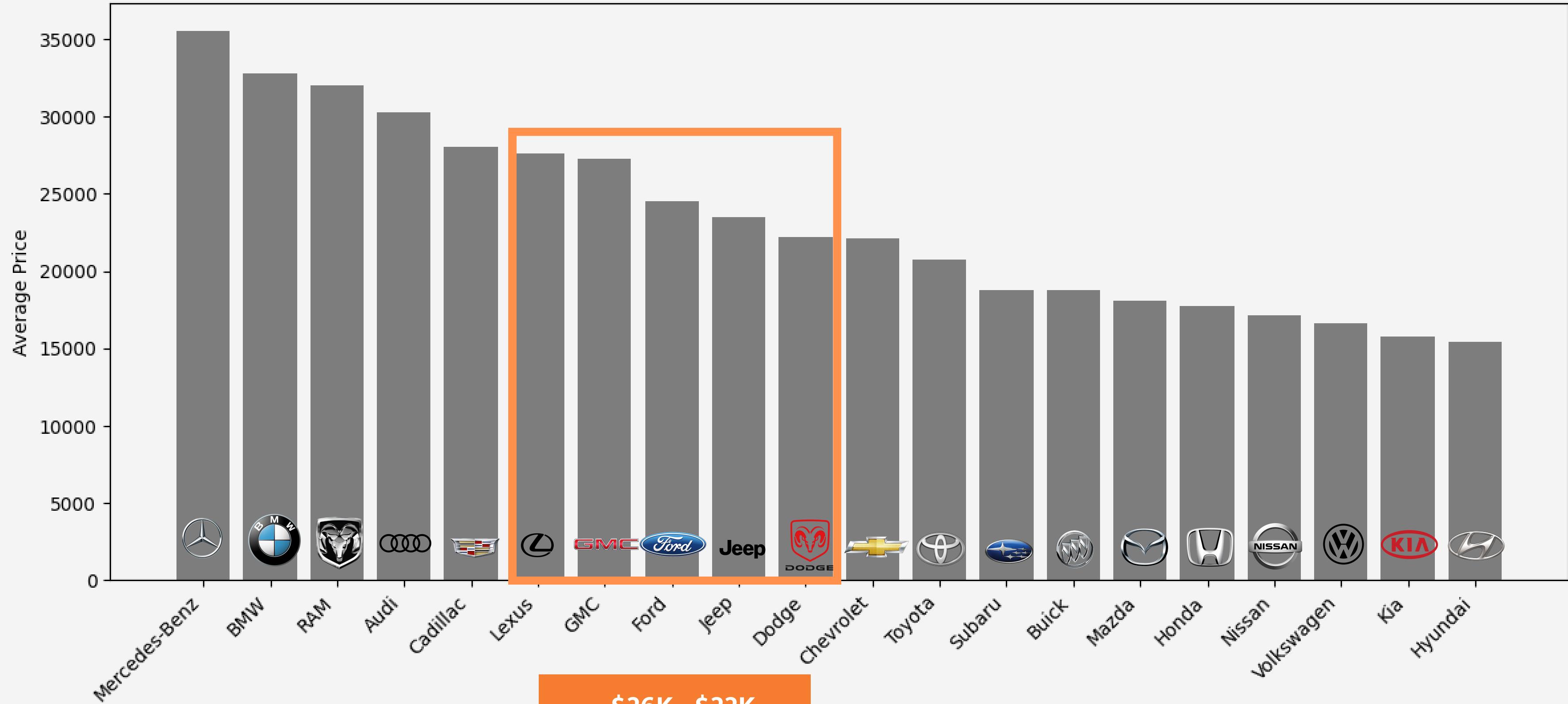
# Average Prices for Top 20 Car Makes



# Average Prices for Top 20 Car Makes



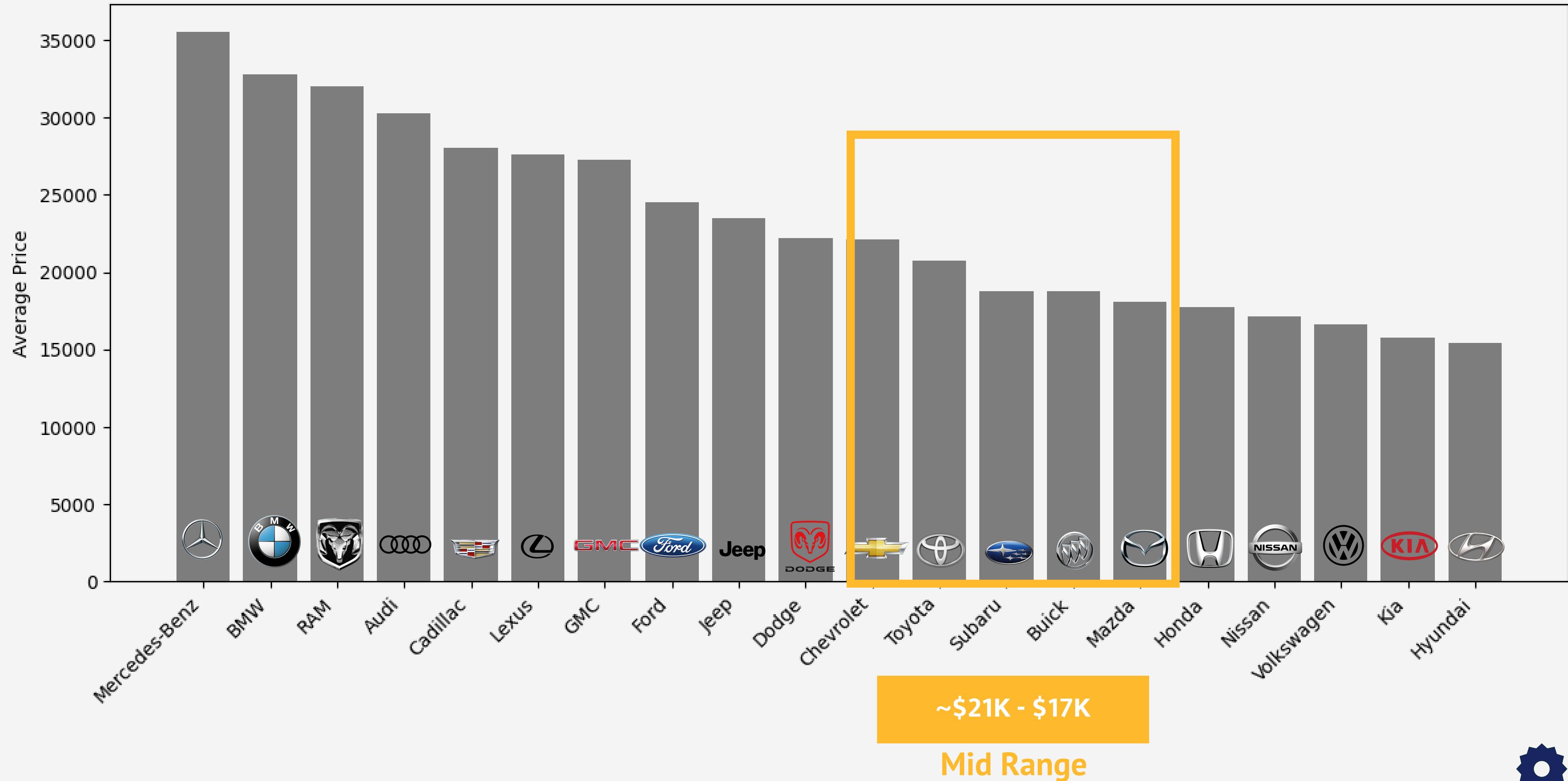
# Average Prices for Top 20 Car Makes



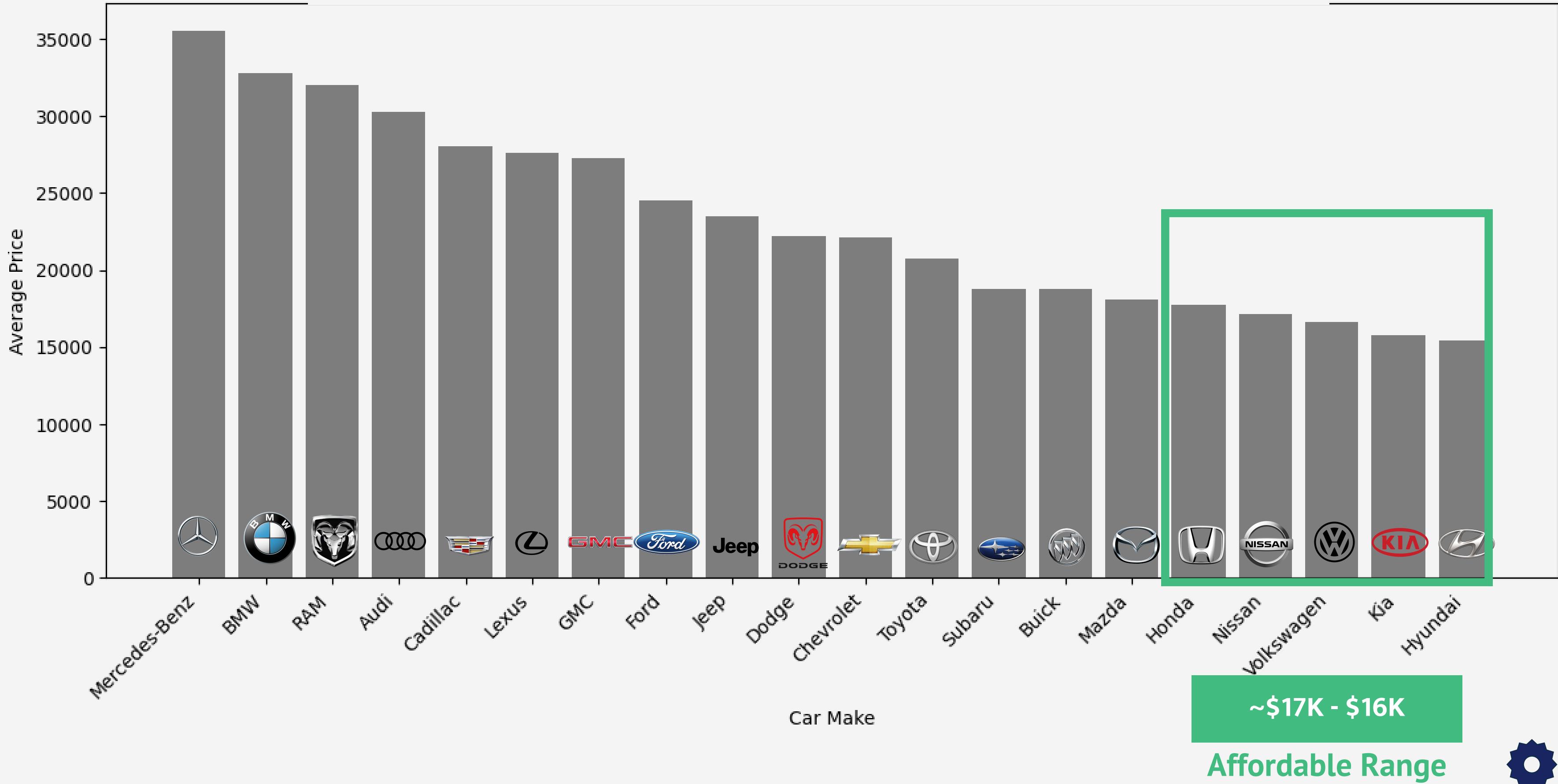
Upper-Mid Range



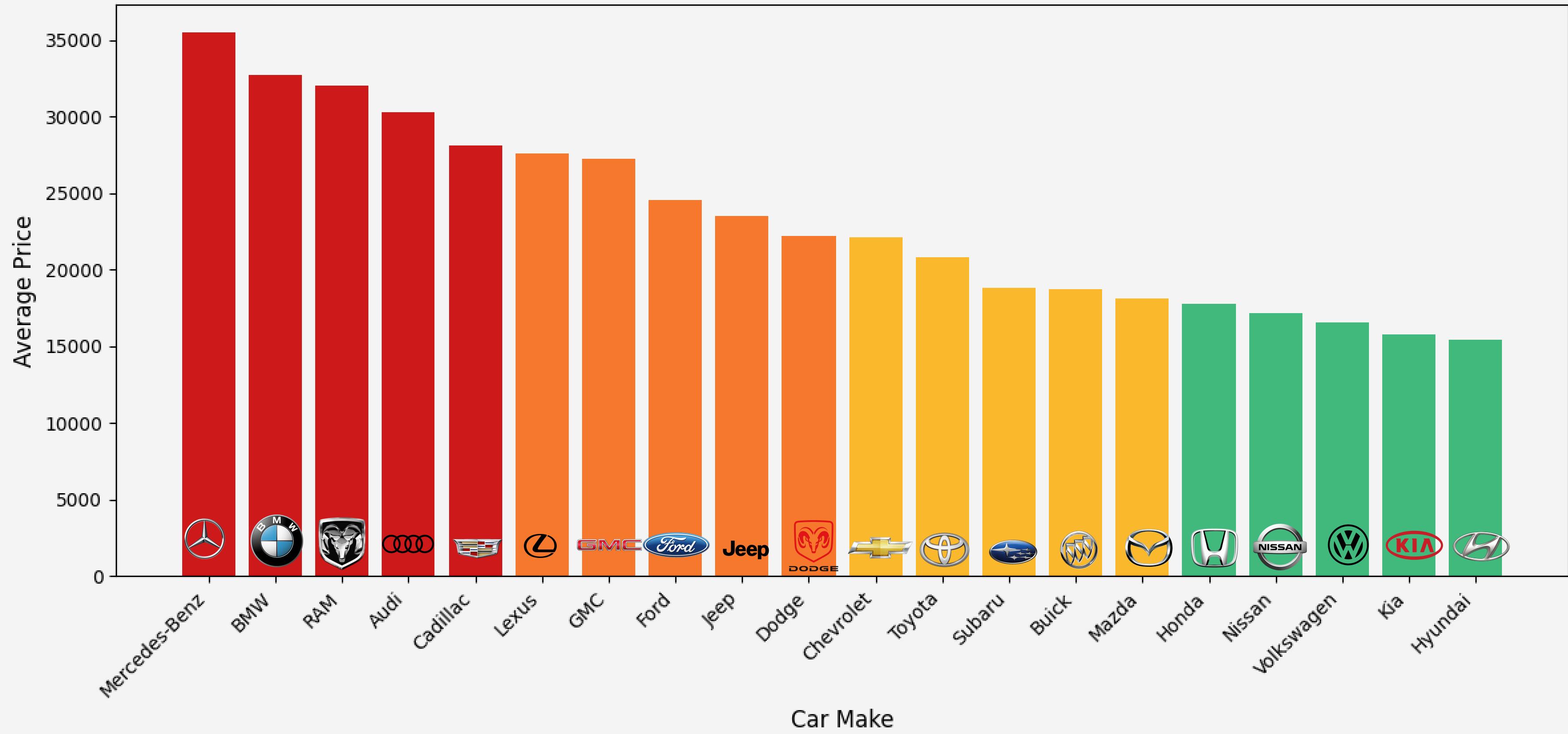
# Average Prices for Top 20 Car Makes



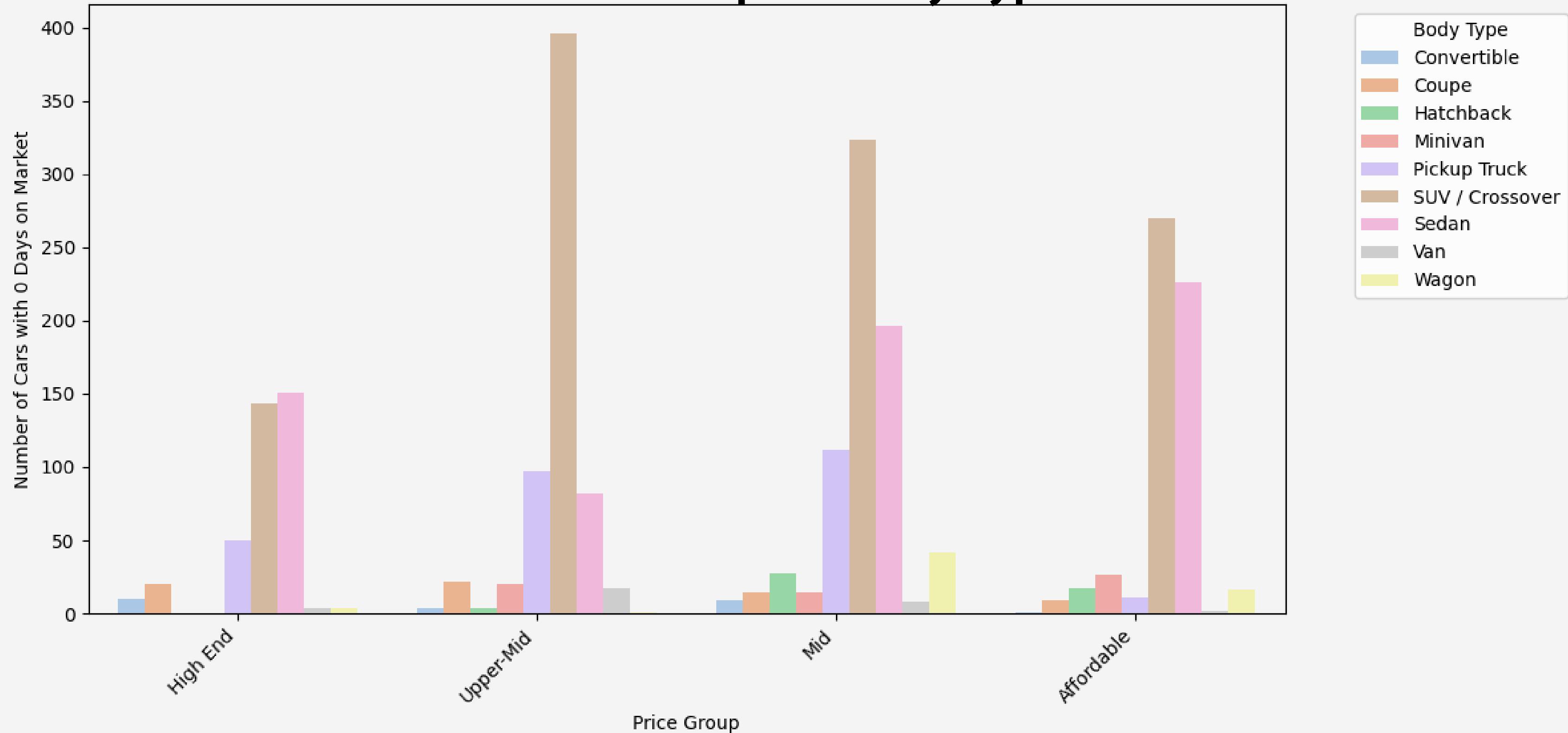
# Average Prices for Top 20 Car Makes



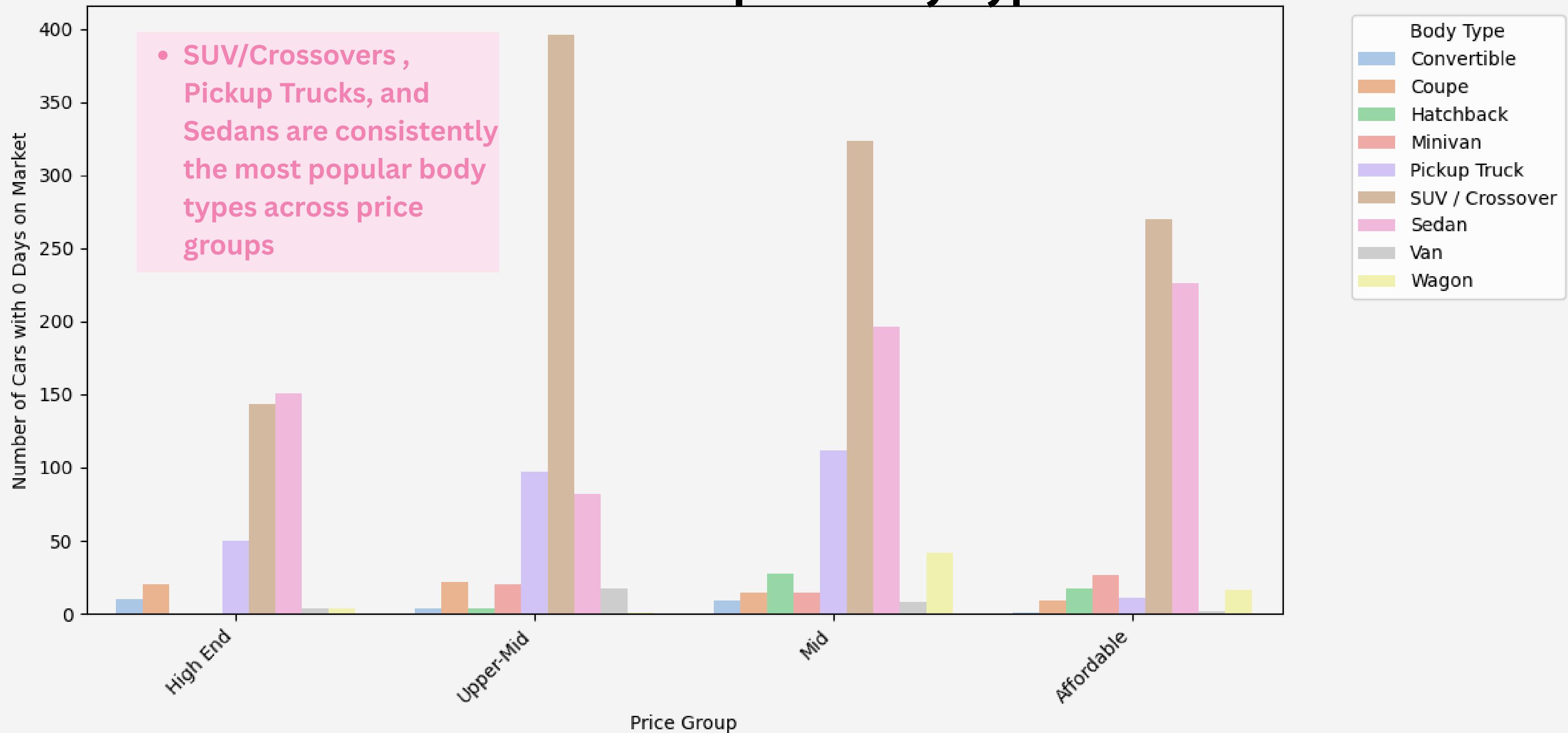
# Average Prices for Top 20 Car Makes



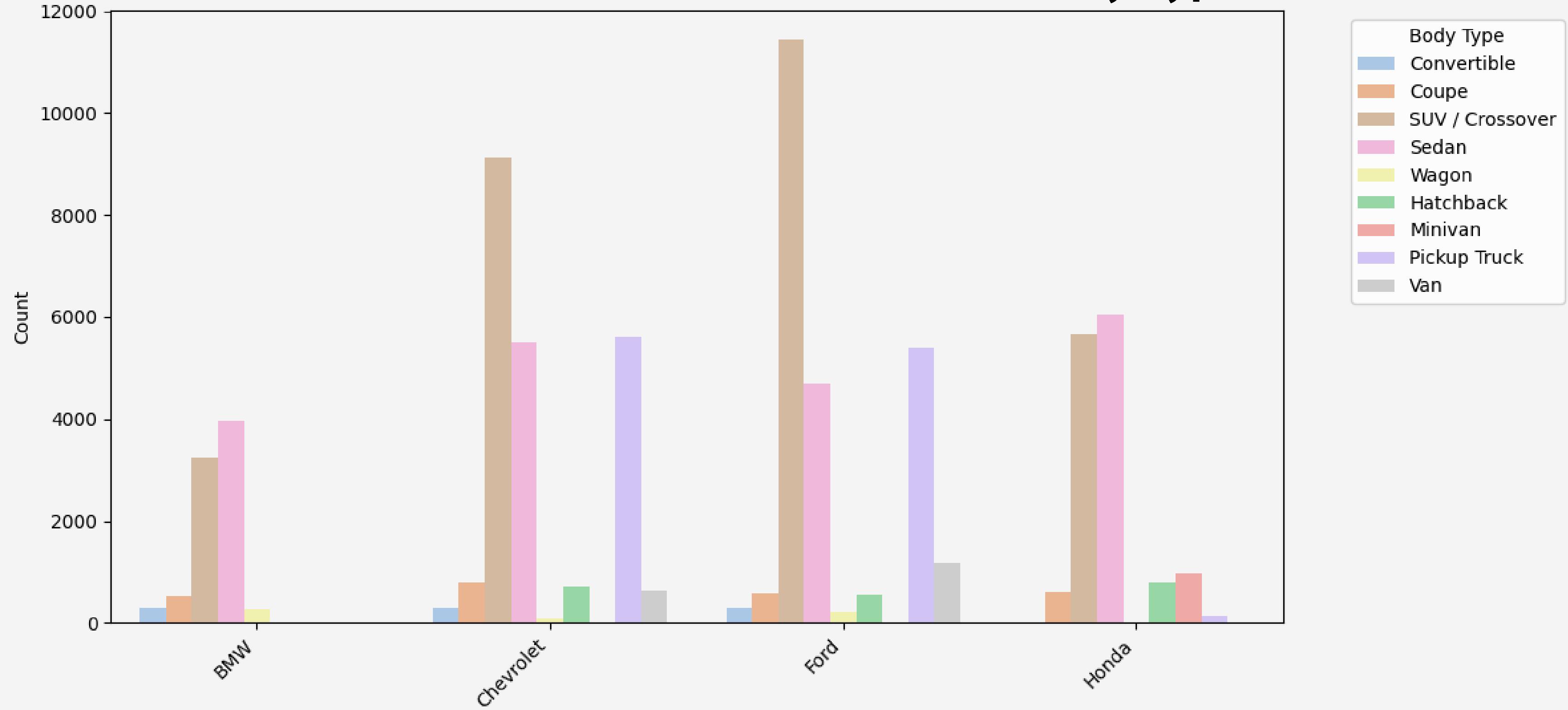
# Price Group vs. Body Type



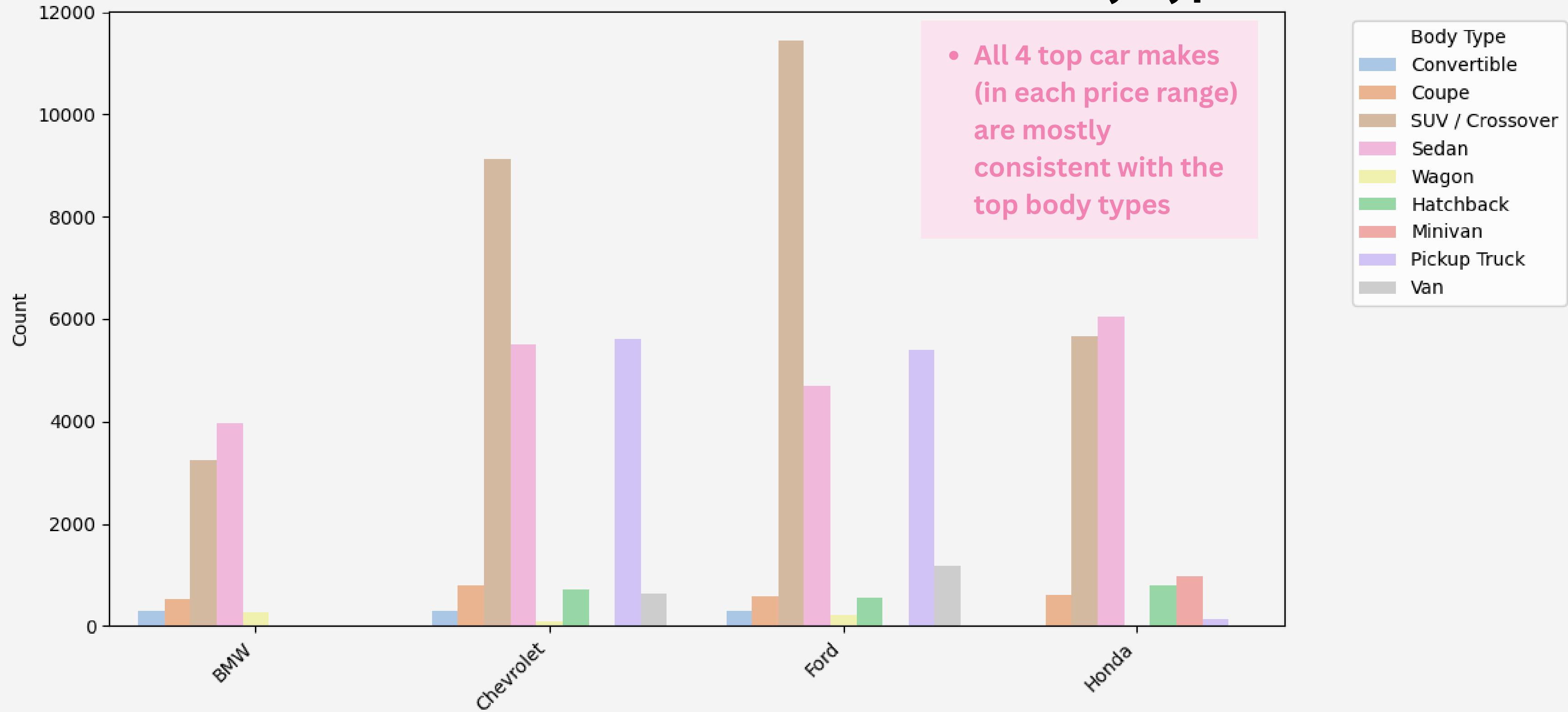
# Price Group vs. Body Type

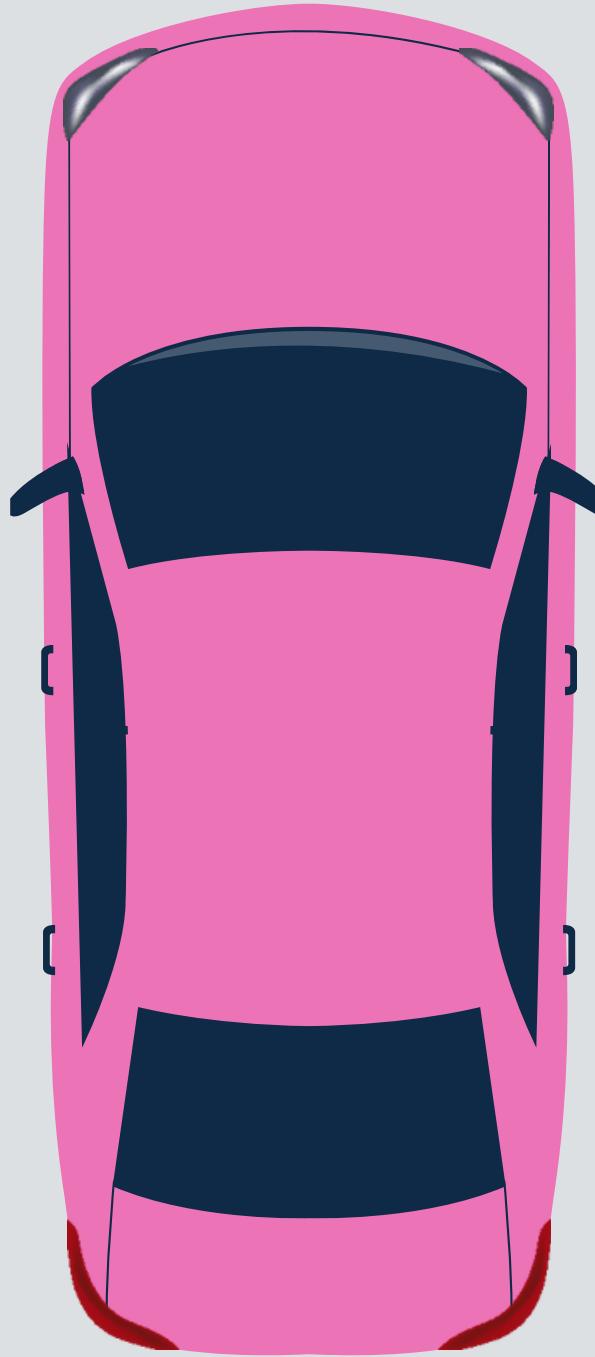


# BMW, Ford, Chevrolet, Honda vs. Body Type



# BMW, Ford, Chevrolet, Honda vs. Body Type

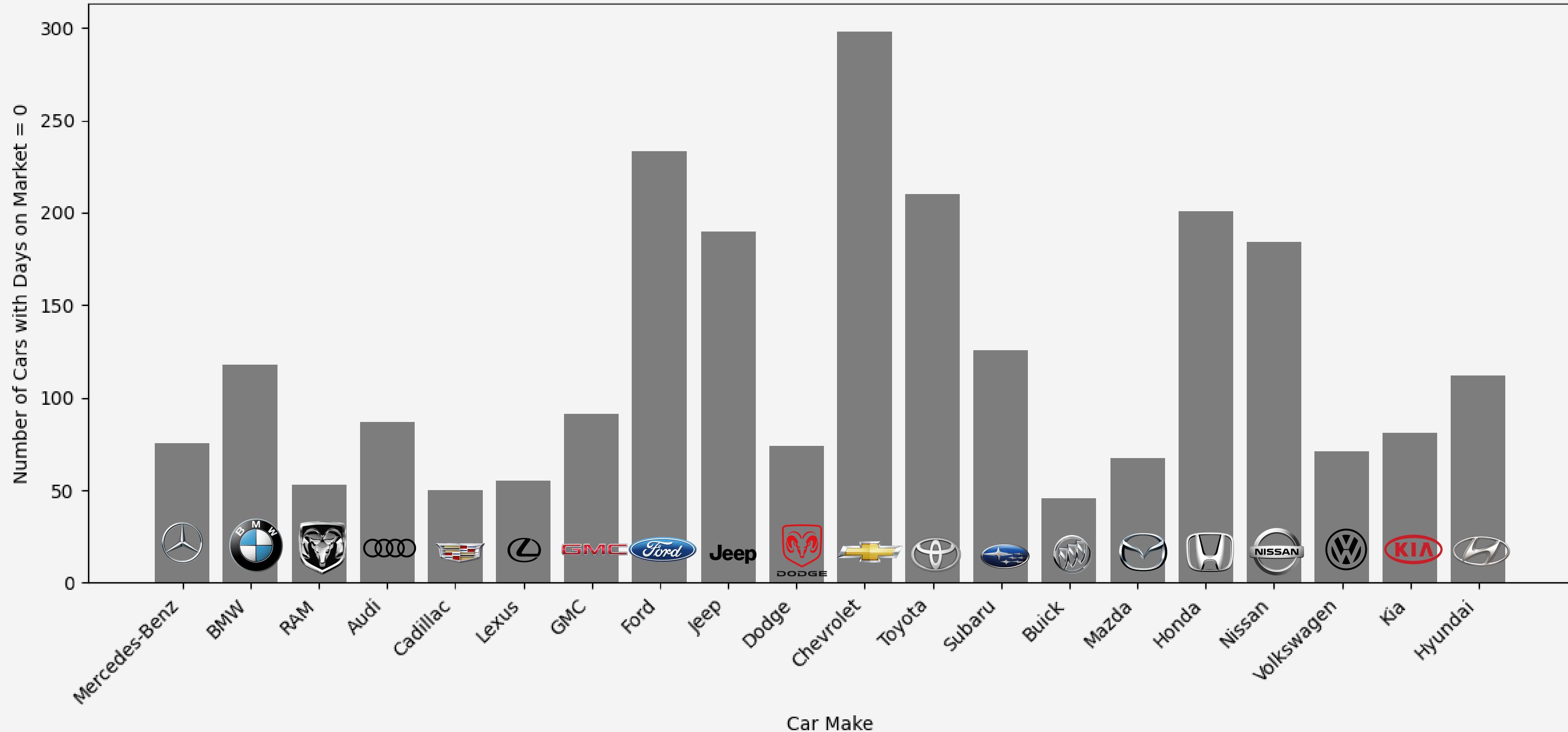




Days On  
Market



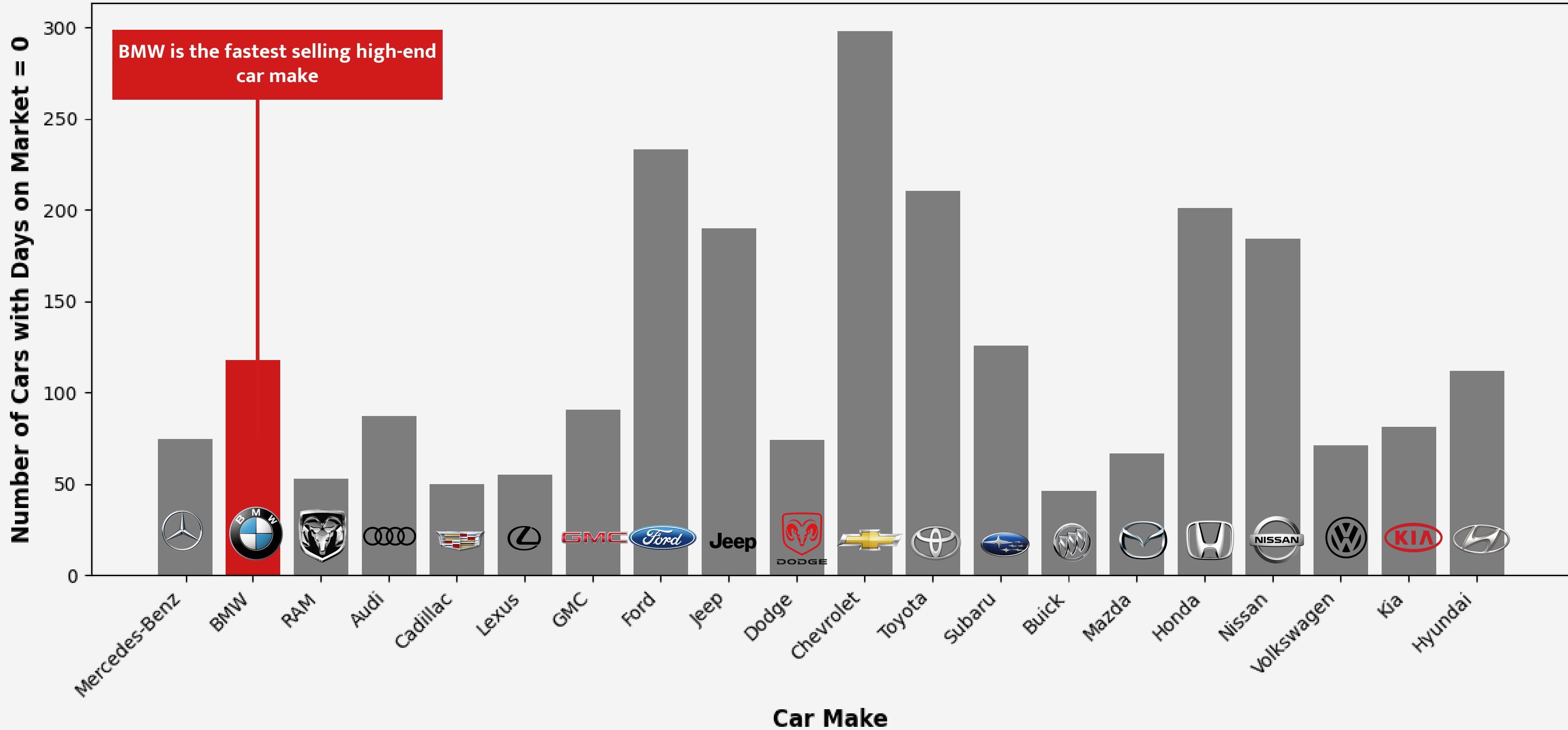
# Top 20 Cars Makes with 0 Days on Market



\*0 Days on Market means it sold fast



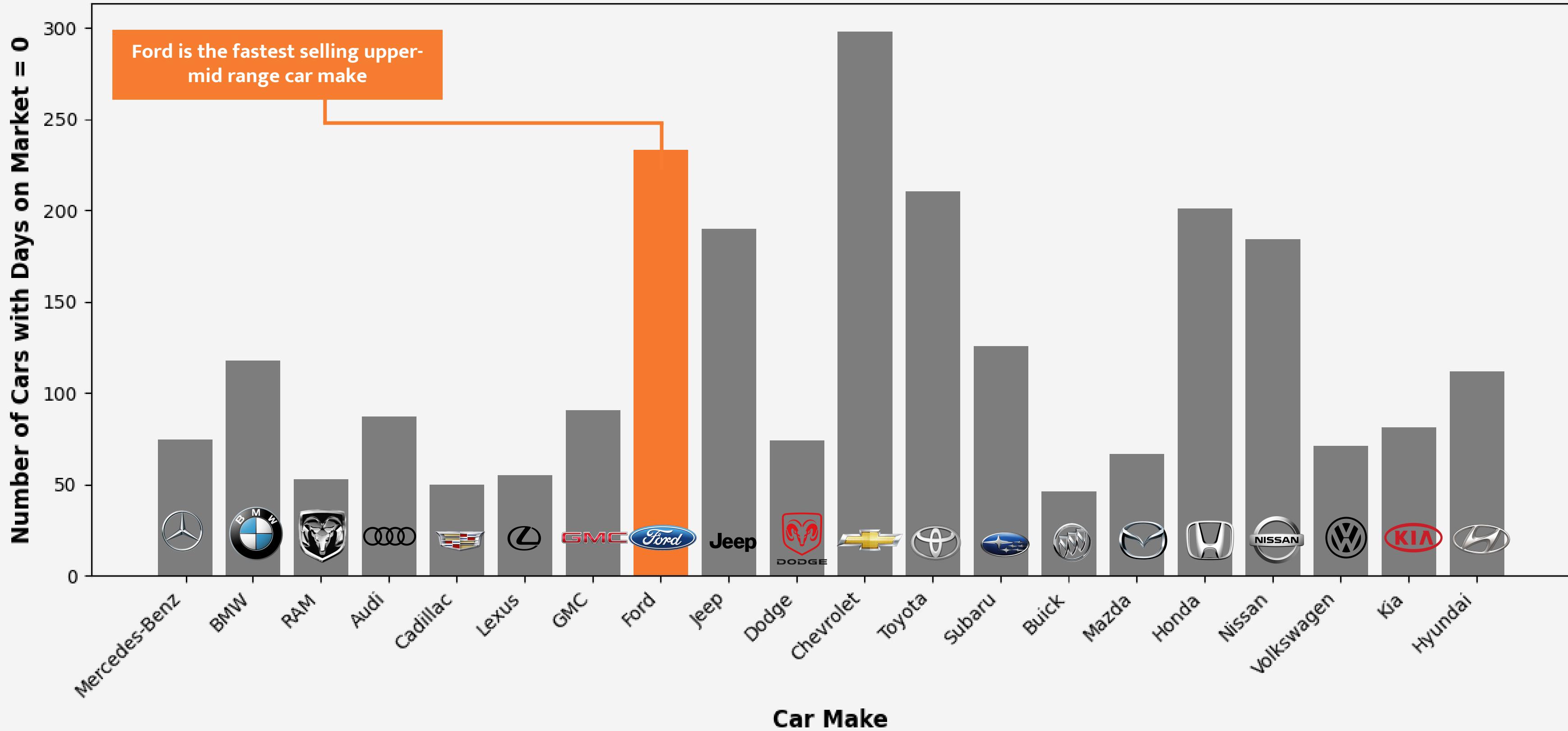
# Top 20 Cars Makes with 0 Days on Market



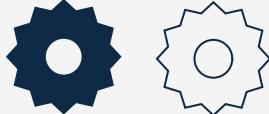
\*0 Days on Market means it sold fast



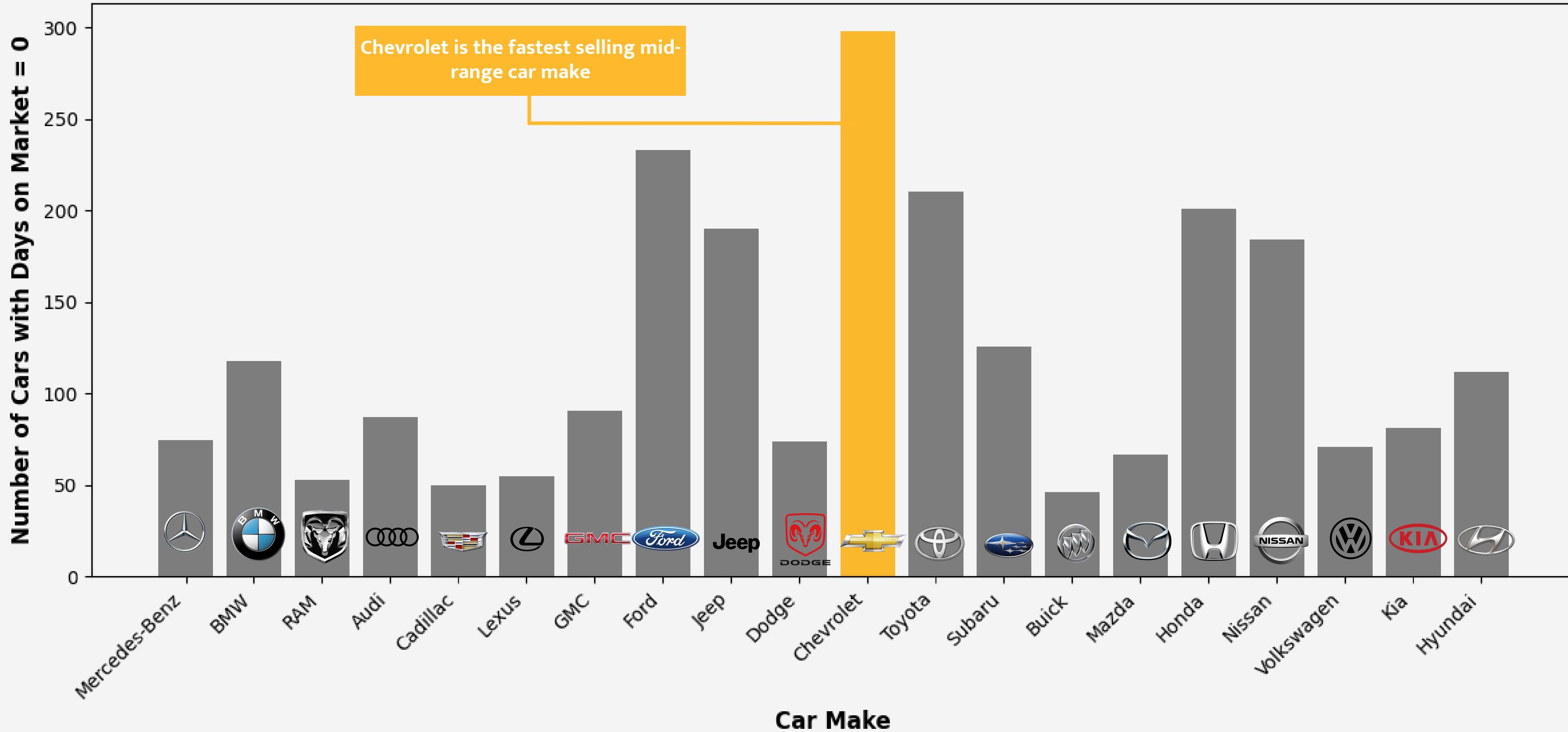
# Top 20 Cars Makes with 0 Days on Market



\*0 Days on Market means it sold fast



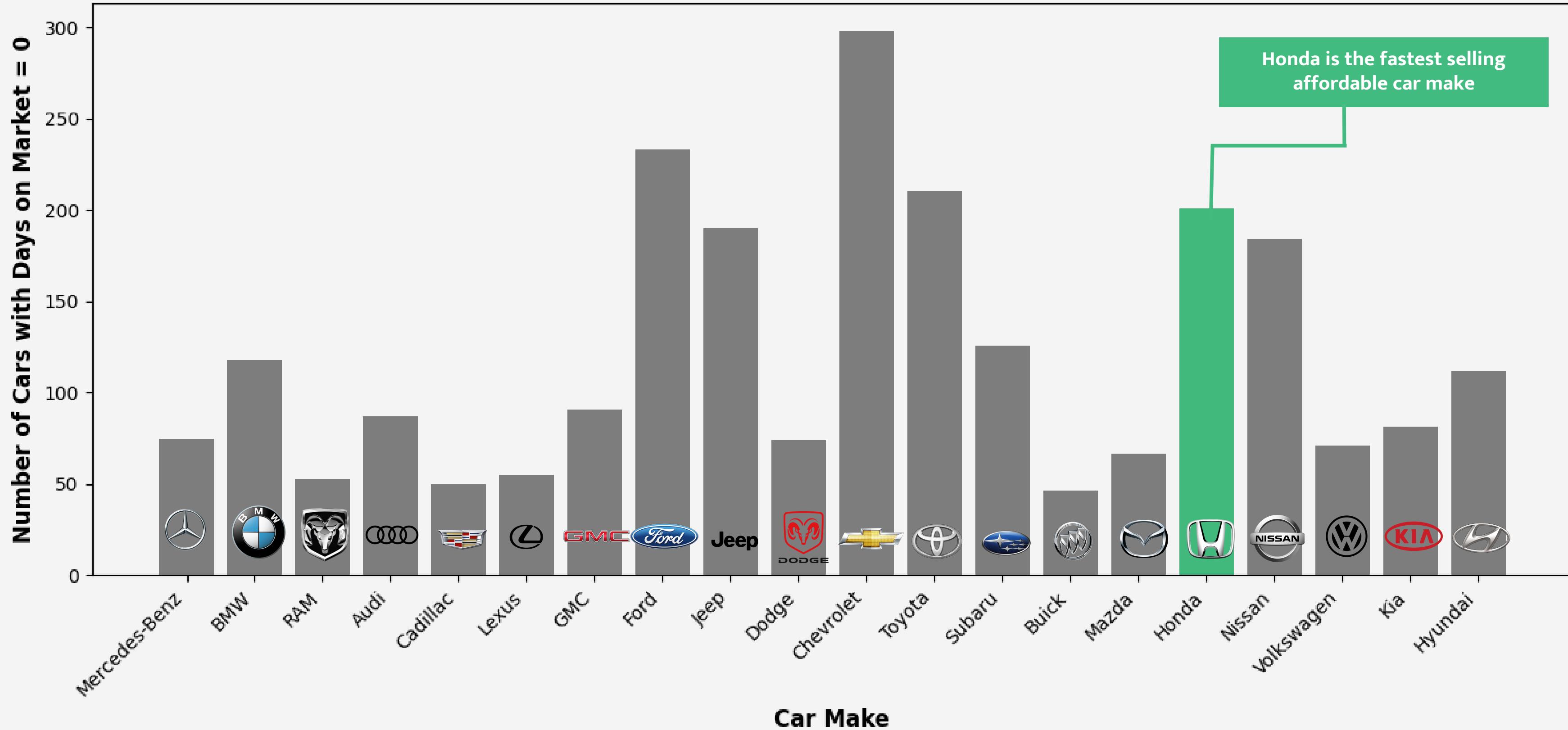
# Top 20 Cars Makes with 0 Days on Market



Chevrolet is the fastest selling mid-range car make



# Top 20 Car Makes with 0 Days on Market



\*0 Days on Market means it sold fast





# From our analysis on price & zero days on market, if you are selling:



- A high-end range car
  - BMW has the most listings with 0 days on the market
  - SUV / Crossover & Sedan
- An upper-mid range car
  - Ford has the most listings with 0 days on the market
  - SUV / Crossover, Pickup, & Sedan
- A mid-range car
  - Chevrolet has the most listings with 0 days on the market
  - SUV / Crossover, Pickup, & Sedan
- An affordable car
  - Honda has the most listings with 0 days on the market
  - SUV / Crossover & Sedan





# Machine- Learning



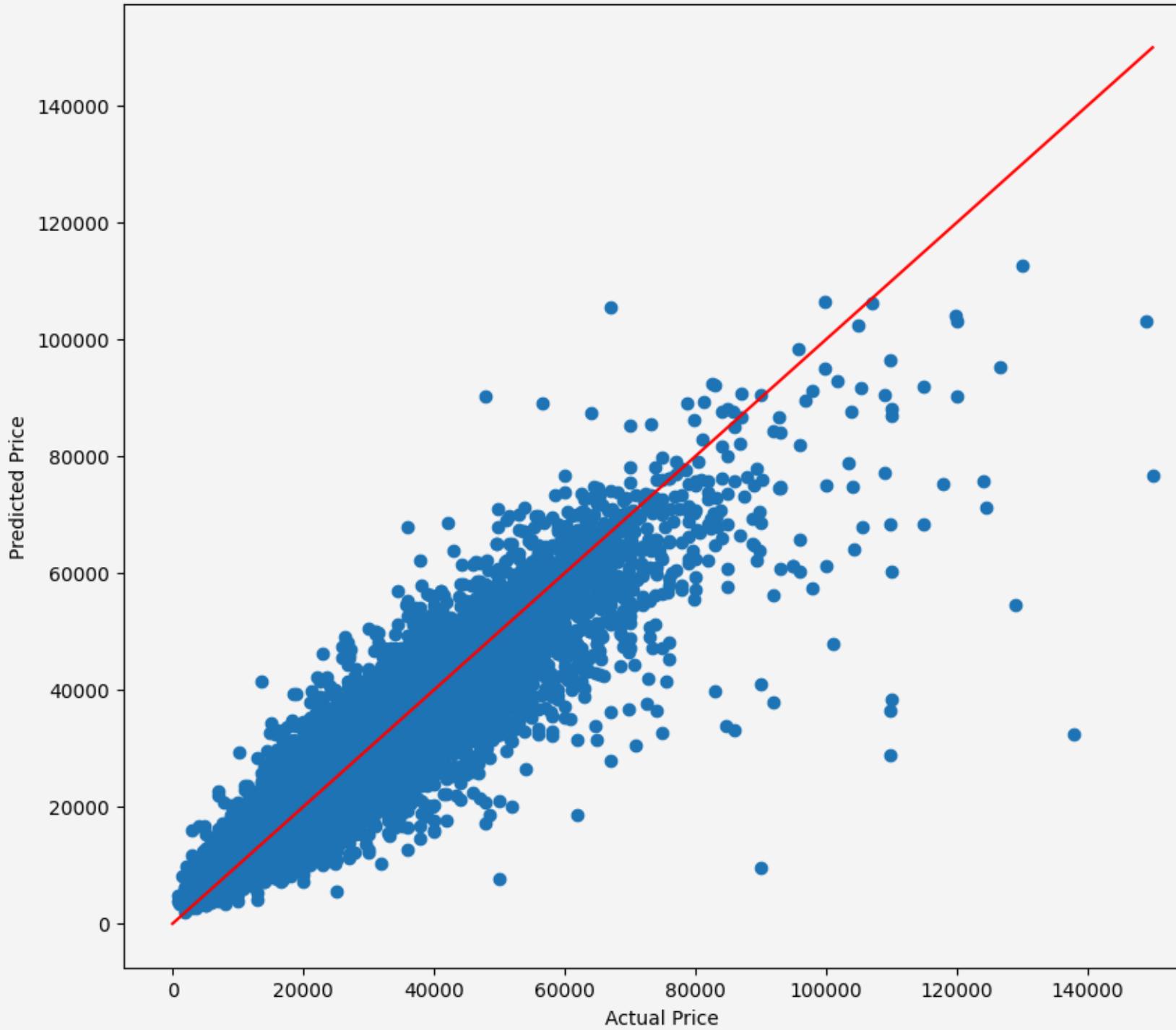


# Data Preparation

- **Various Models:**
  - Random Forrest Regressor
  - Linear Regression
  - KNearest Neighbors Regressor
- **Train test split**
  - Training set (70%), testing set (30%)
  - Stratified by make name - ensure each car brand is proportionally represented in both sets
- **Scaled data** - standardized numerical features to account for differences in scale
- **60 → 40 Columns**



# KNearest Neighbors Regressor



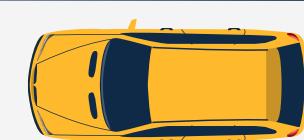
**Mean Absolute Error:** 2301.07

**Mean Squared Error:** 13523612.81

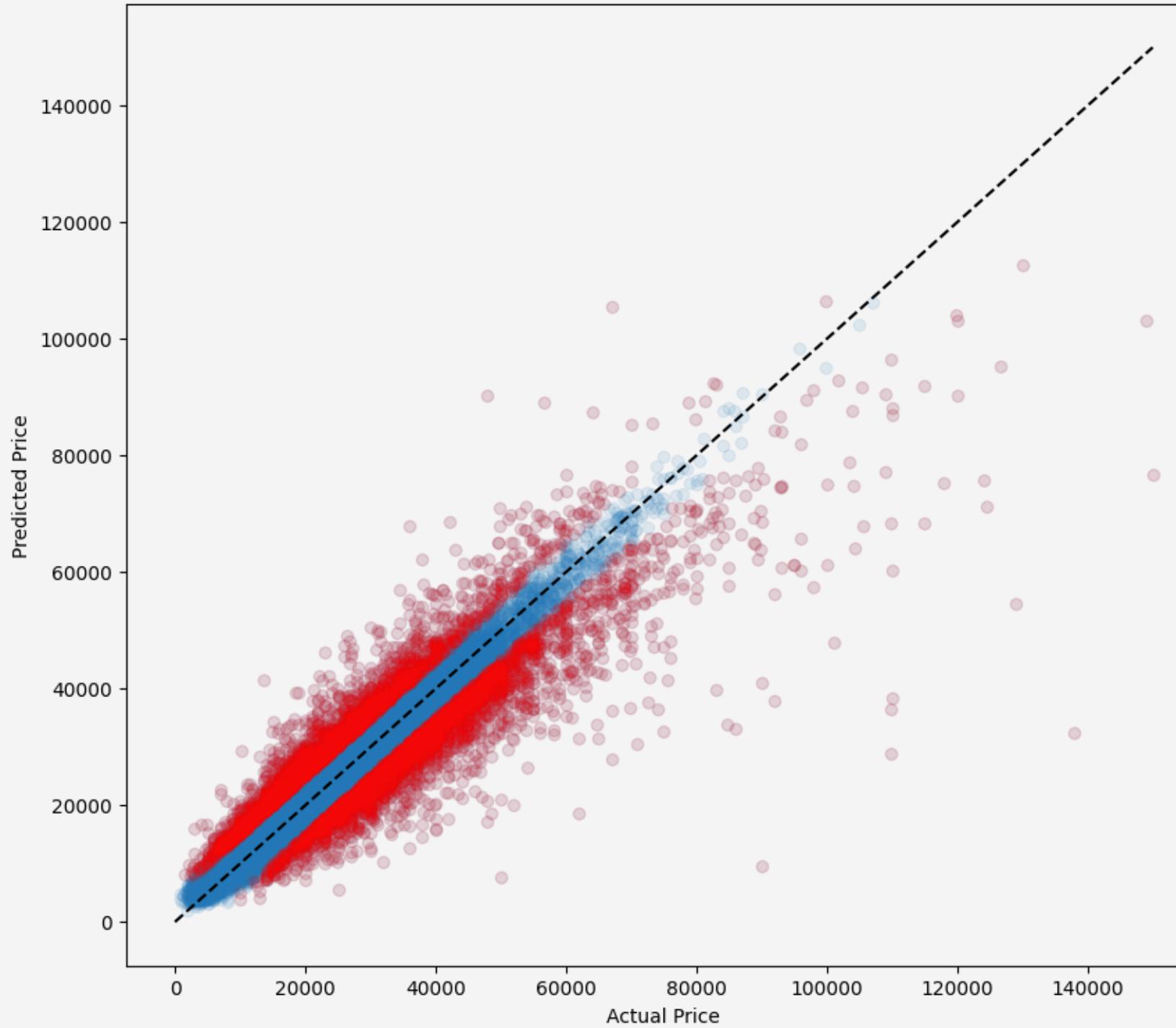
**R<sup>2</sup>:** 0.90

**Best Parameters (GridSearchCV):**

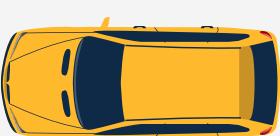
- Number of neighbors = 5
- P = 2 (Euclidean)
- Weight = Distance



# Model Analysis



- The blue makes up 90% of our data, the red is 10%
  - Underestimates more than overestimate
- Most of the red consists of our high-end cars, even though they make up the least amount of our data
- Car Make
  - Highest: Audi, BMW, and Mercedes
  - Lowest: Hyundai, Mazda, and Honda
- Body Type
  - Highest: Convertible and Coupe
  - Lowest: Hatchback and Wagon



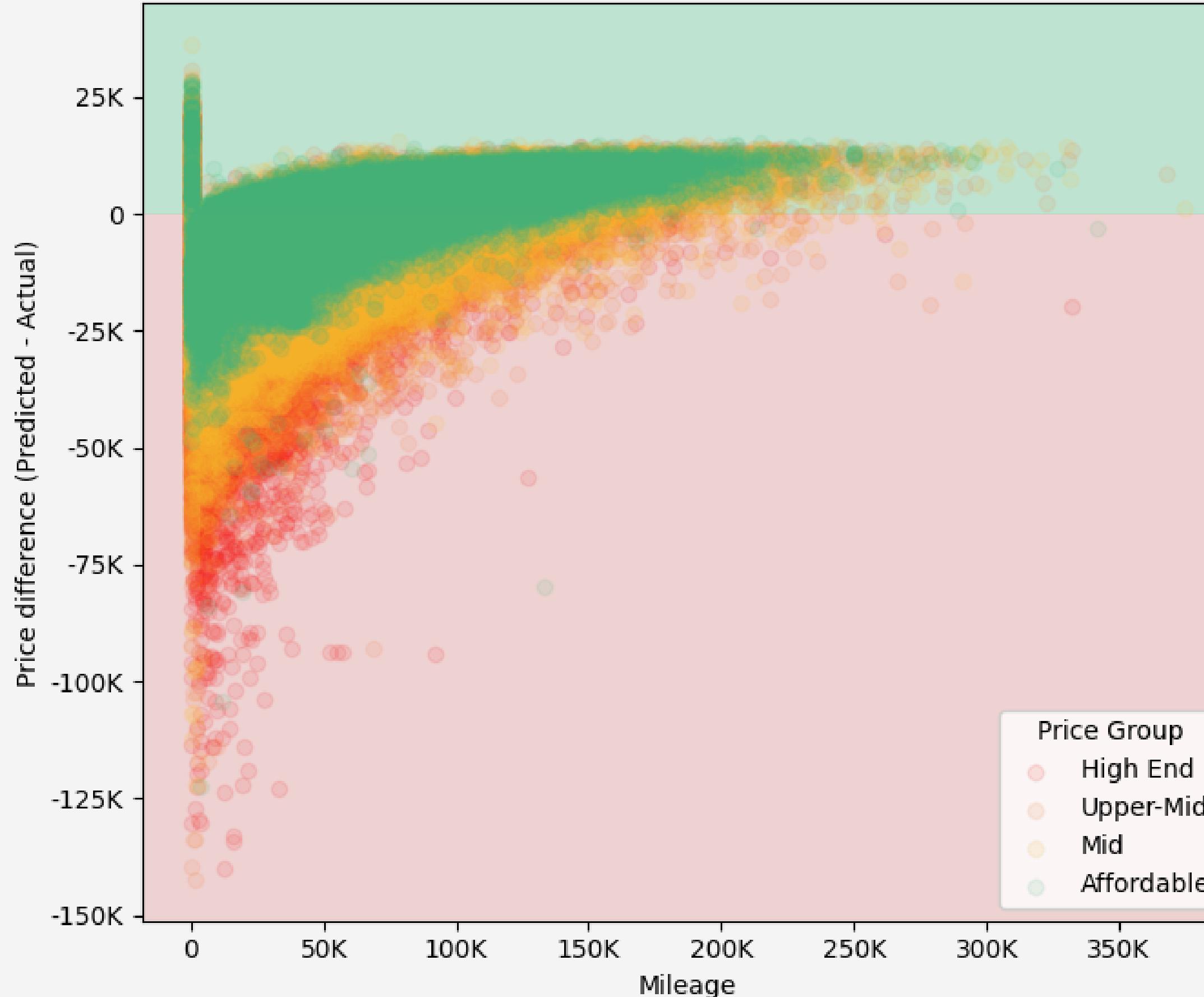


# Model Interpretation

- **Price Difference = Predicted Market Value – Actual Listing Price**
- Positive (+) Difference
  - The car is listed for **less** than its predicted market value
  - Possibly **underpriced** or a **good deal**
- Negative (-) Difference
  - The car is listed for **more** than its predicted market value
  - Possibly **overpriced**

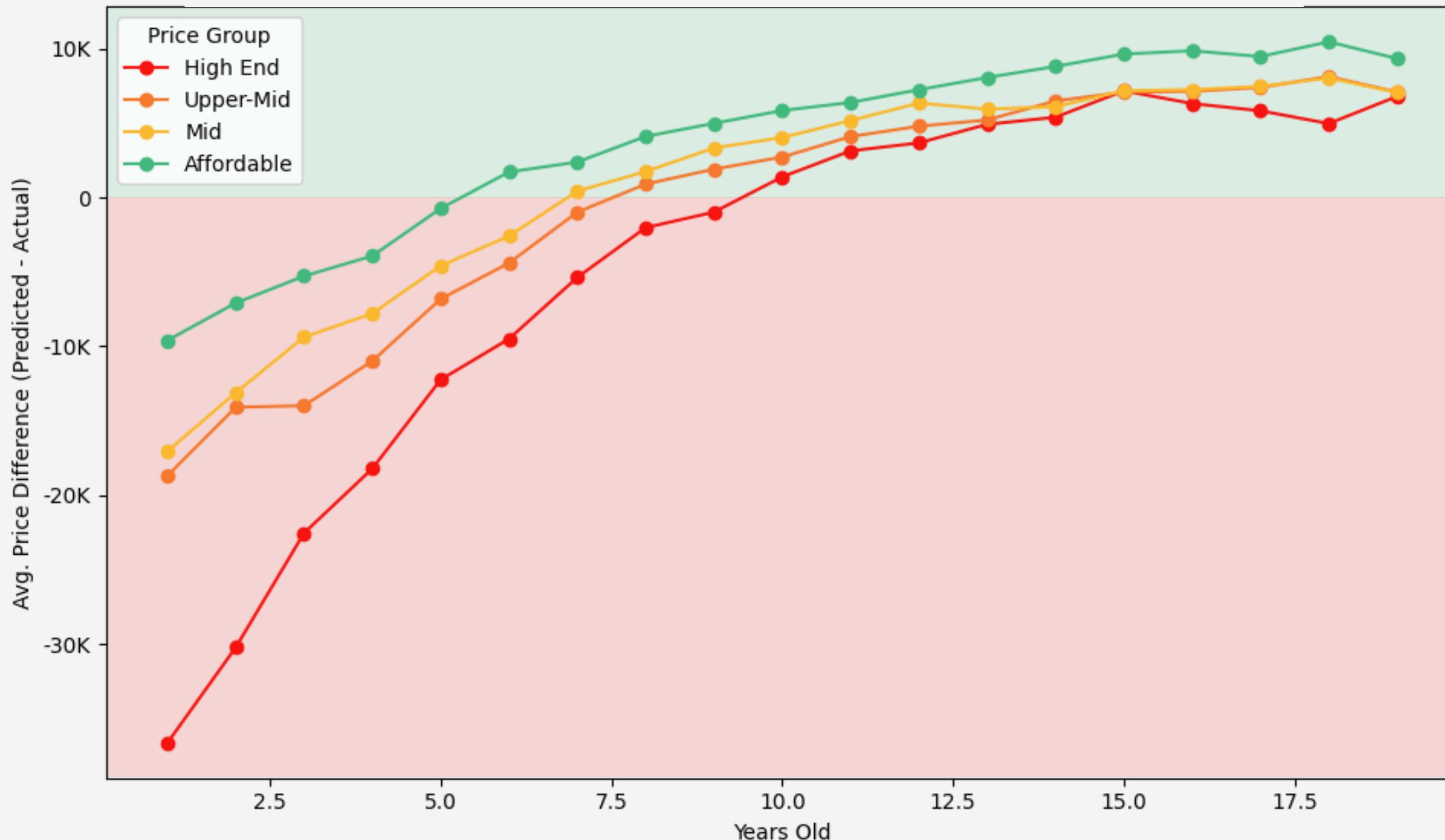


# Scatter Plot by Price Group and Mileage



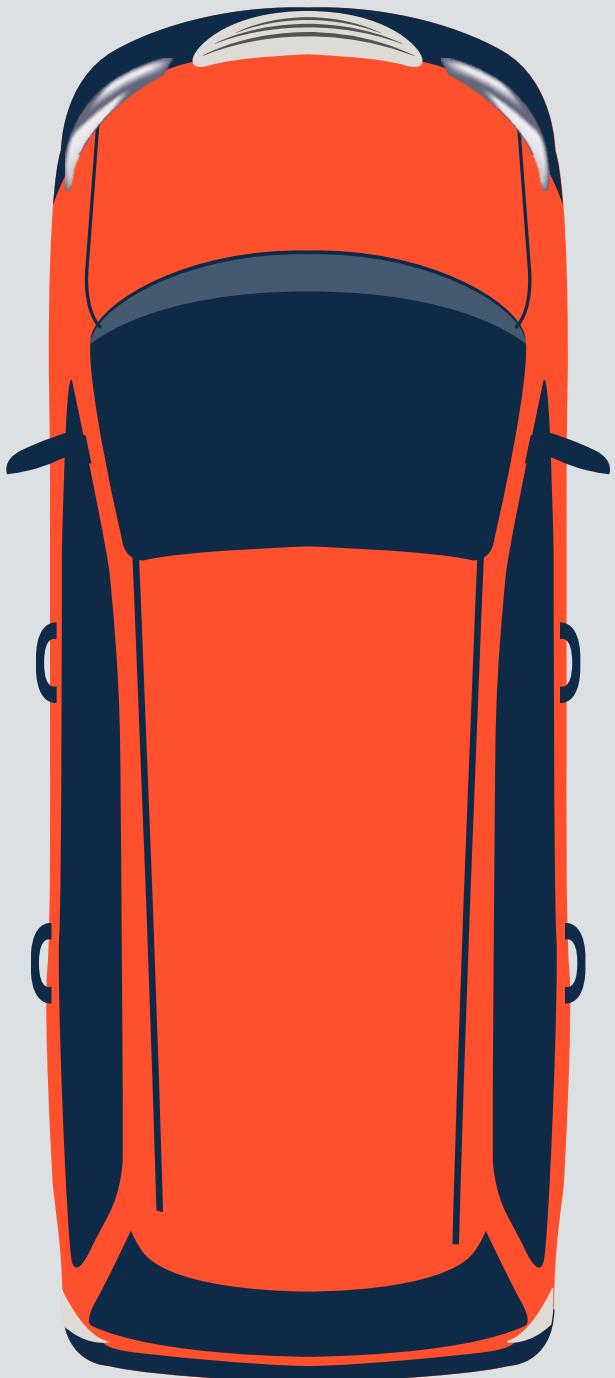
- Consensus:
  - **Higher Mileage => Better Deal**
  - **Lower Mileage => More expensive (Overpriced)**

# Average Price Differences by Car Age



- Consensus:
  - Higher Age => Better Deal
  - Lower Age => More expensive (Overpriced)

# Conclusion





# Conclusion

- Most popular body types across all price groups:
  - SUVs, Crossovers, Pickup Trucks, Sedans
- Fastest-selling car brands by price range:
  - High-end: BMW
  - Upper-mid: Ford
  - Mid-range: Chevrolet
  - Affordable: Honda
- These brands align with popular body types and sell faster than others
- K-Nearest Neighbors Regressor was our best model ( $R^2 = 0.90$ )
- Higher Mileage & Older Aged Cars = Affordable Prices





---

# Thank you, any questions?

