



TRAINITY



# IMPACT OF CAR FEATURES



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# AGENDA

- ***PROJECT DESCRIPTION***
- ***APPROACH***
- ***TECH STACK - USED***
- ***INSIGHTS***
- ***TASKS***
- ***DASHBOARD***
- ***RESULTS***
- ***DRIVE LINK***

# PROJECT DESCRIPTION

- *This project aims to help a car manufacturer boost profitability by optimizing pricing and product development decisions.*
- *It involves using data analysis techniques like regression and market segmentation to understand how car features, market categories, and pricing are related.*
- *This analysis will inform a pricing strategy that aligns with consumer demand and profitability, while also guiding future product development efforts.*
- *The ultimate goal is to enhance the manufacturer's competitiveness and drive long-term profitability.*



# APPROACH

- PROJECT OBJECTIVES DEFINITION
- DATA COLLECTION
- DATA ARRANGEMENT
- DESCRIPTIVE ANALYSIS
- CORRELATION ANALYSIS
- REGRESSION MODELING

- MARKET DIVISION
- PRICING STRATEGY EVALUATION
- PROFITABILITY APPRAISAL
- DECISION-MAKING FOR PRICING
- PRODUCT DEVELOPMENT DECISIONS
- ONGOING TRACKING AND ADJUSTMENT

# TECH-STACK USED



*Microsoft Excel*

# INSIGHTS

- **Feature Importance Analysis:** Examining the Correlation between Car Features and Pricing to Identify Key Influential Features.
- **Market Segmentation:** Segmenting the Market Based on Consumer Preferences and Buying Behavior Using Clustering Techniques or Pivot Tables.
- **Price Elasticity of Demand Analysis:** Analyzing Price Elasticity of Demand to Understand Customer Sensitivity to Pricing Changes.
- **Profitability Assessment:** Evaluating the Profitability of Different Car Models, Market Categories, or Customer Segments.
- **Competitive Analysis:** Analyzing Competitors' Pricing Strategies, Product Offerings, and Market Positioning.
- **Future Demand Forecasting:** Forecasting Future Demand Based on Historical Data and Regression Analysis Utilizing Pricing, Features, and Market Categories.
- **Pricing Strategy Optimization:** Optimizing Pricing Strategies Using Regression Analysis and Market Data.
- **Product Development Prioritization:** Identifying Influential and Desired Features Based on Correlation Analysis and Market Segmentation for Product Development Prioritization.

# TASKS

# DATA CLEANING

DUPPLICATES REMOVED

715

NULL VALUES REMOVED

102

LINK FOR CLEANED DATA SET

[https://drive.google.com/file/d/1kFMfpNO\\_D8UbLVA6jFYr7E0ooJ2o0015/view  
?usp=sharing](https://drive.google.com/file/d/1kFMfpNO_D8UbLVA6jFYr7E0ooJ2o0015/view?usp=sharing)

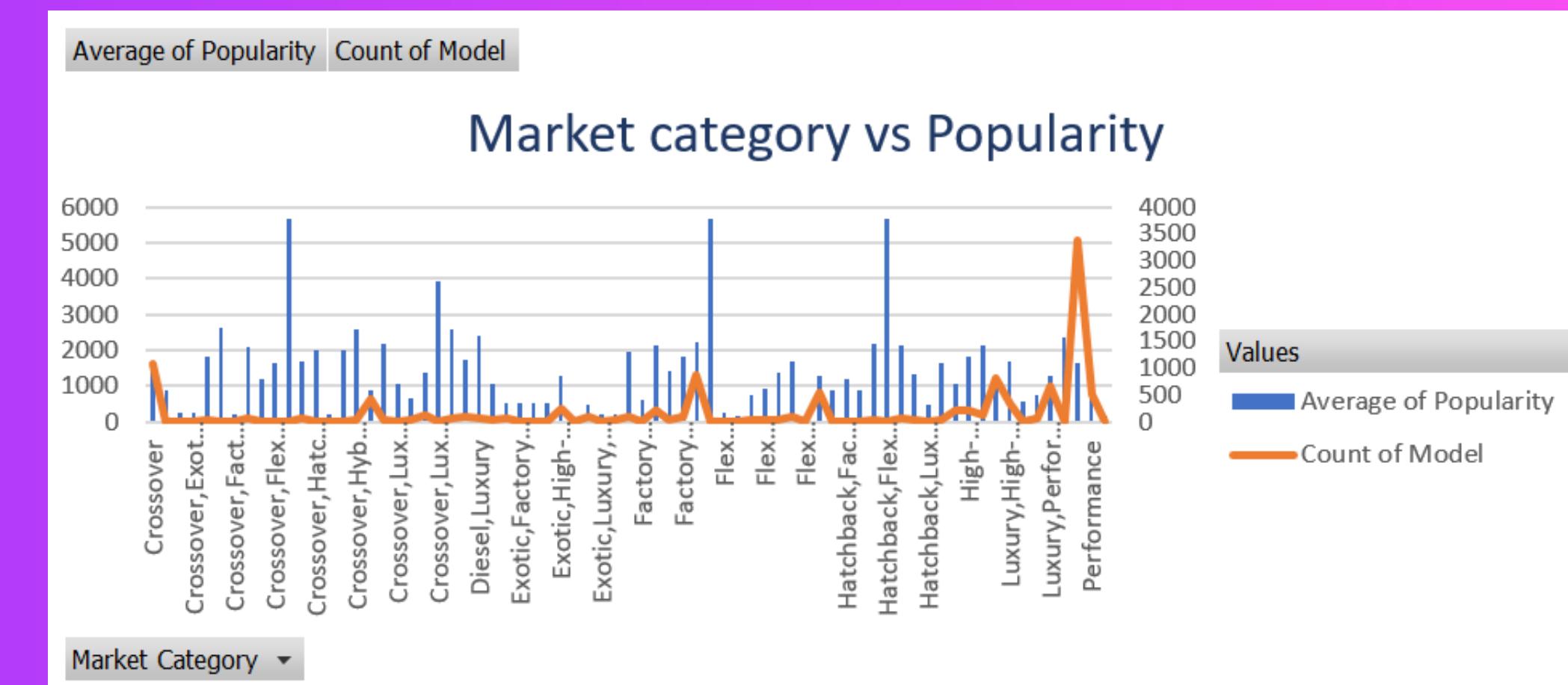
**Task 1.A:** Create a pivot table that shows the number of car models in each market category and their corresponding popularity scores.

**Task 1.B:** Create a combo chart that visualizes the relationship between market category and popularity.

## Sample Output

Market Category	Average of Popularity	Count of Model
Crossover	1539.475655	1068
Crossover,Diesel	873	7
Crossover,Exotic,Luxury,High-Performance	238	1
Crossover,Exotic,Luxury,Performance	238	1
Crossover,Factory Tuner,Luxury,High-Performance	1823.461538	26
Crossover,Factory Tuner,Luxury,Performance	2607.4	5
Crossover,Factory Tuner,Performance	210	4
Crossover,Flex Fuel	2073.75	64
Crossover,Flex Fuel,Luxury	1173.2	10
Crossover,Flex Fuel,Luxury,Performance	1624	6
Crossover,Flex Fuel,Performance	5657	6
Crossover,Hatchback	1675.694444	72
Crossover,Hatchback,Factory Tuner,Performance	2009	6
Crossover,Hatchback,Luxury	204	7
Crossover,Hatchback,Performance	2009	6
Crossover,Hybrid	2563.380952	42
Crossover,Luxury	889.2142857	406
Crossover,Luxury,Diesel	2195.848485	33
Crossover,Luxury,High-Performance	1037.222222	9
Crossover,Luxury,Hybrid	630.9166667	24
Crossover,Luxury,Performance	1349.089286	112
Crossover,Luxury,Performance,Hybrid	3916	2
Crossover,Performance	2585.956522	69
Diesel	1730.904762	84

## Combo chart



Drive Link for full output:

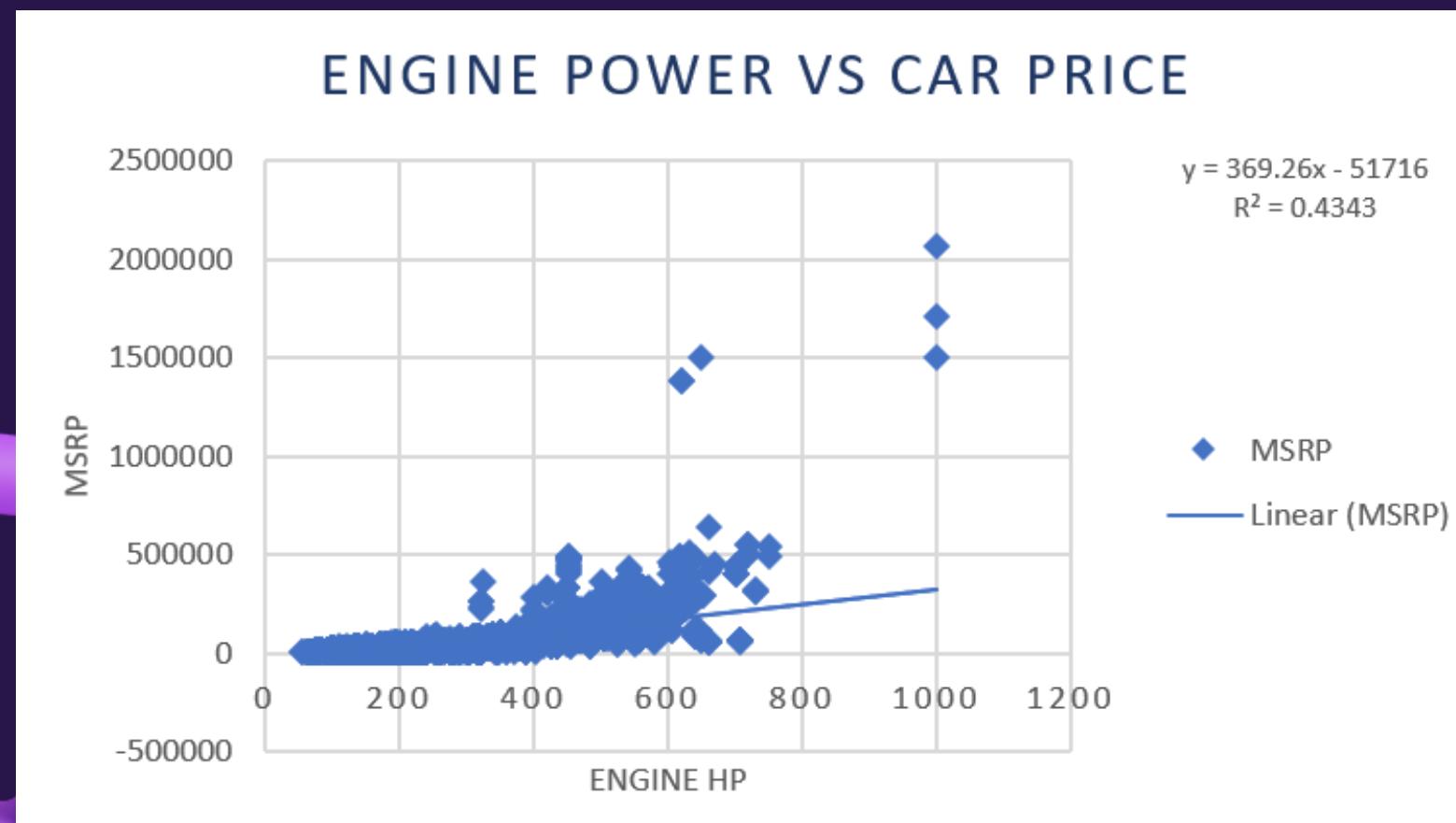
[https://docs.google.com/spreadsheets/d/1BdKl-BD6hC8K0BiQKtVhe93MH\\_Ko1frF/edit?  
usp=drive\\_link&ouid=101394161962274505358&rtpof=true&sd=true](https://docs.google.com/spreadsheets/d/1BdKl-BD6hC8K0BiQKtVhe93MH_Ko1frF/edit?usp=drive_link&ouid=101394161962274505358&rtpof=true&sd=true)

# DEDUCTION FROM TASK 1

- "Crossover" vehicles are the most common with 1,068 models, averaging a popularity of 1,539.47.
- "Crossover, performance" has 69 models with an average popularity of 2,585.96.
- "Flex fuel" vehicles are prevalent, with 855 models having an average popularity of 2,225.71.
- "Luxury" vehicles come in various subcategories, ranging from 1,084.21 to 2,333.18 in average popularity among 819 models.
- There are many "crossover" vehicles in the market, and they are quite popular.
- "Performance" crossovers are even more popular.
- "Flex fuel" vehicles are also common and fairly popular.
- "Luxury" vehicles come in different types, and their popularity varies depending on the specific type.

**Task 2:** Create a scatter chart that plots engine power on the x-axis and price on the y-axis. Add a trendline to the chart to visualize the relationship between these variables.

## SCATTER CHART



## DEDUCTION

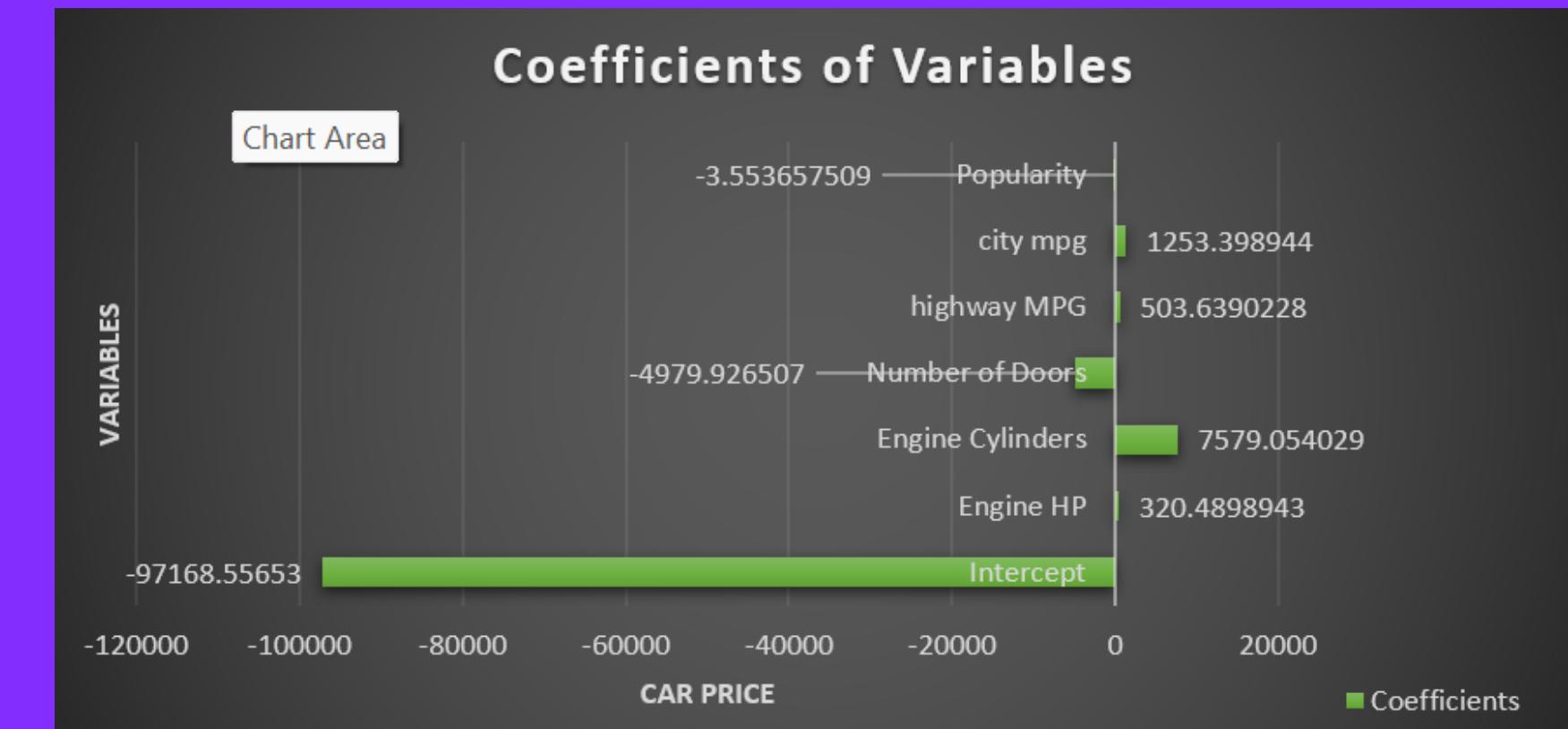
- "Higher engine horsepower (HP) usually means a higher car price."
- The data strongly positively correlated and supports this, with an equation ( $y = 369.26x - 51,716$ ) and an R-squared value of 0.4343.
- More powerful cars generally cost more, and this relationship is well-supported by the data.

*Task 3: Use regression analysis to identify the variables that have the strongest relationship with a car's price. Then create a bar chart that shows the coefficient values for each variable to visualize their relative importance.*

## COEFFICIENTS

	Coefficients
Intercept	-97168.55653
Engine HP	320.4898943
Engine Cylinders	7579.054029
Number of Doors	-4979.926507
highway MPG	503.6390228
city mpg	1253.398944
Popularity	-3.553657509

## BAR CHART



*The bar chart highlights the key factors influencing car prices, with a focus on engine-related factors and fuel efficiency. Other factors like the number of doors and popularity have less pronounced effects.*

# DEDUCTION FROM TASK 3

**Base Price (Intercept):** The base price of the car, before considering any other factors, starts at approximately -\$97,169. This means it's a negative value, which might not be meaningful in practice.

**Engine HP (Horsepower):** Each additional unit of engine horsepower adds around \$320 to the car's price. More powerful engines result in higher costs.

**Engine Cylinders:** The number of engine cylinders significantly impacts the price. Each extra cylinder adds approximately \$7,579 to the car's cost, emphasizing the importance of performance.

**Number of Doors:** More doors reduce the car's price. Each additional door decreases the price by approximately \$4,980.

**Highway MPG (Miles Per Gallon):** Better fuel efficiency on the highway corresponds to a higher price. Each additional mile per gallon adds about \$504 to the cost.

**City MPG:** Improved city fuel efficiency leads to a higher price. Each additional mile per gallon in the city increases the car's price by roughly \$1,253.

**Popularity:** While the effect is relatively small, increasing popularity slightly lowers the price. For every unit increase in popularity, the price decreases by about \$3.55.

In summary, these coefficients help understand how specific factors contribute to a car's price, with positive coefficients indicating a price increase and negative coefficients indicating a price decrease.

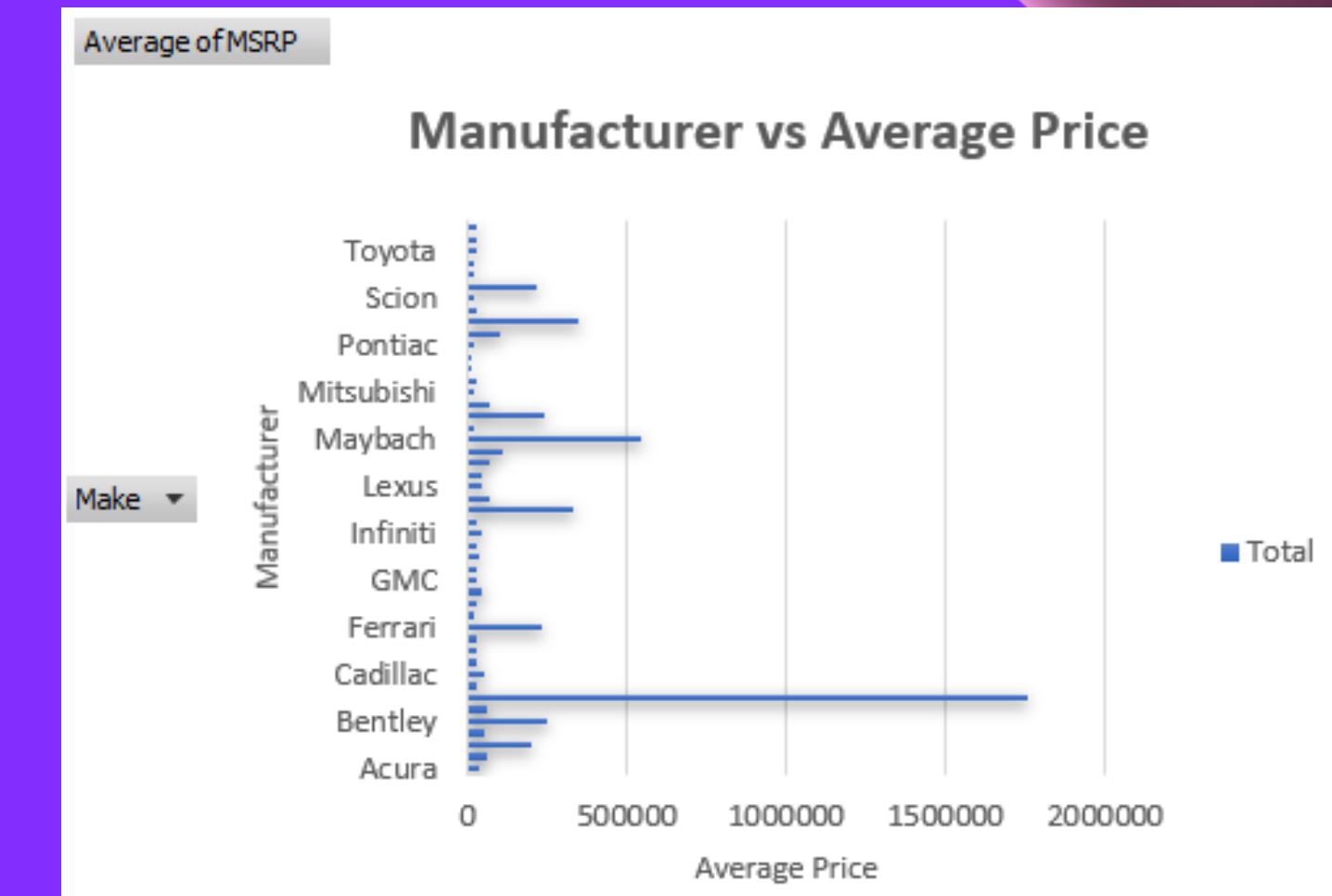
*Task 4.A: Create a pivot table that shows the average price of cars for each manufacturer*

*Task 4.B: Create a bar chart or a horizontal stacked bar chart that visualizes the relationship between manufacturer and average price.*

## Sample Output

Manufacturer	Average of MSRP
Acura	35087.4878
Alfa Romeo	61600
Aston Martin	198123.4615
Audi	54574.1215
Bentley	247169.3243
BMW	62162.55864
Bugatti	1757223.667
Buick	29034.18947
Cadillac	56368.26515
Chevrolet	29000.2214
Chrysler	26722.96257
Dodge	24857.04537
Ferrari	237383.8235
FIAT	22206.01695
Ford	28522.86207
Genesis	46616.66667
GMC	32444.08506
Honda	26608.88399
HUMMER	36464.41176
Hyundai	24926.26255
Infiniti	42640.27134
Kia	25318.75
Lamborghini	331567.3077
Land Rover	68067.08633

## Bar Chart



## Drive Link for full output:

[https://docs.google.com/spreadsheets/d/1p6sKQaQDfPgaBFbO5-jJZRQNuzB-bz--/edit?  
usp=drive\\_link&ouid=101394161962274505358&rtpof=true&sd=true](https://docs.google.com/spreadsheets/d/1p6sKQaQDfPgaBFbO5-jJZRQNuzB-bz--/edit?usp=drive_link&ouid=101394161962274505358&rtpof=true&sd=true)

# DEDUCTION FROM TASK 4

**Luxury brands** : Bugatti, Maybach, and Rolls-Royce target elite customers with exceptionally high prices.

**Premium brands** : Aston Martin, Bentley, and Lotus offer style and performance at relatively high price points.

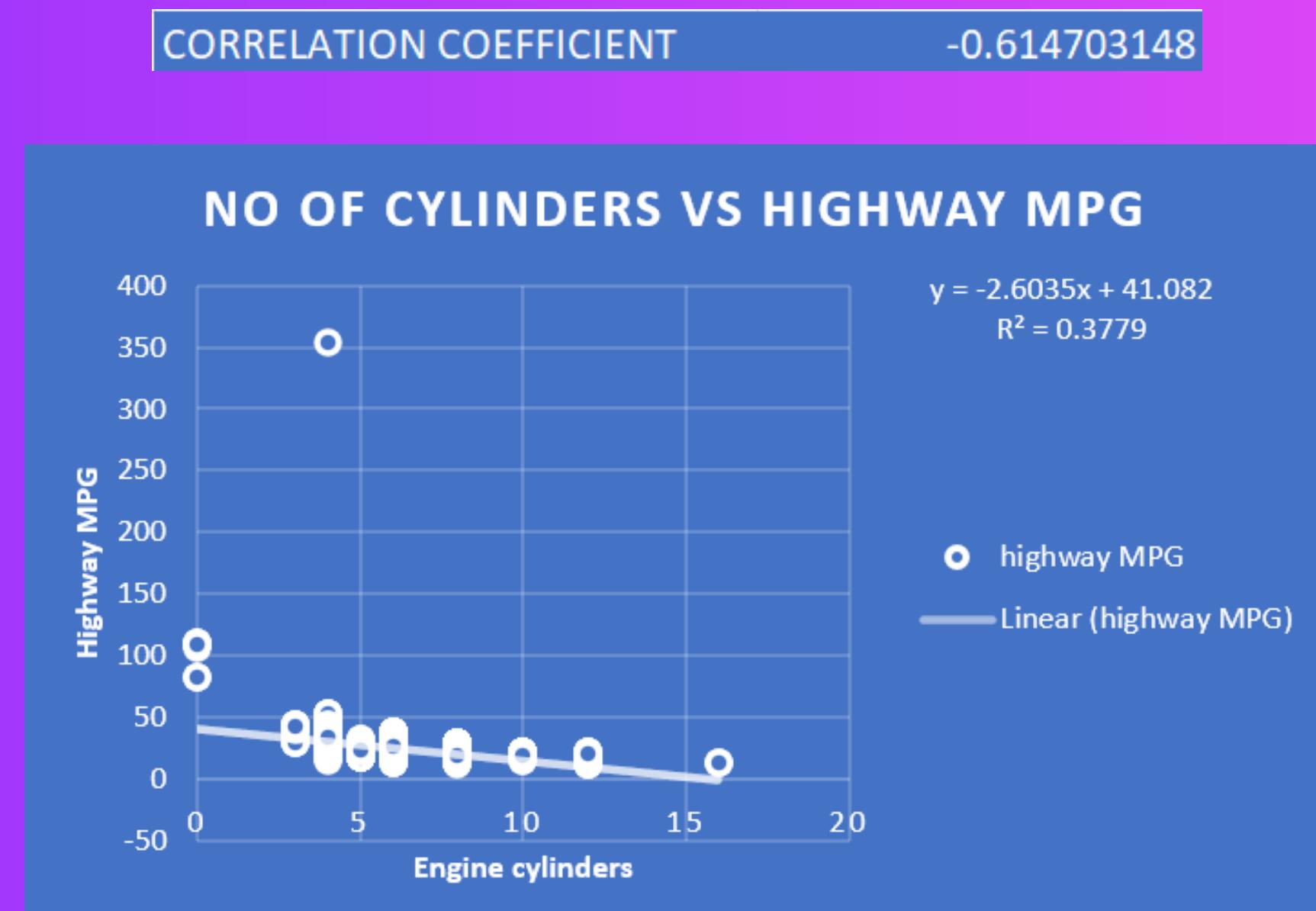
**Mainstream brands** : Toyota, Chevrolet, and Ford focus on reliability and affordability, catering to a broad consumer base.

**Sports car brands** : Lamborghini, McLaren, and Porsche emphasize performance and prestige, with varying price ranges.

**Diverse range brands** : Genesis, Infiniti, and GMC meet specific needs, providing a balance between luxury and affordability, premium features at a moderate cost, and diverse vehicle options.

*Task 5.A: Create a scatter plot with the number of cylinders on the x-axis and highway MPG on the y-axis. Then create a trendline on the scatter plot to visually estimate the slope of the relationship and assess its significance.*

*Task 5.B: Calculate the correlation coefficient between the number of cylinders and highway MPG to quantify the strength and direction of the relationship.*

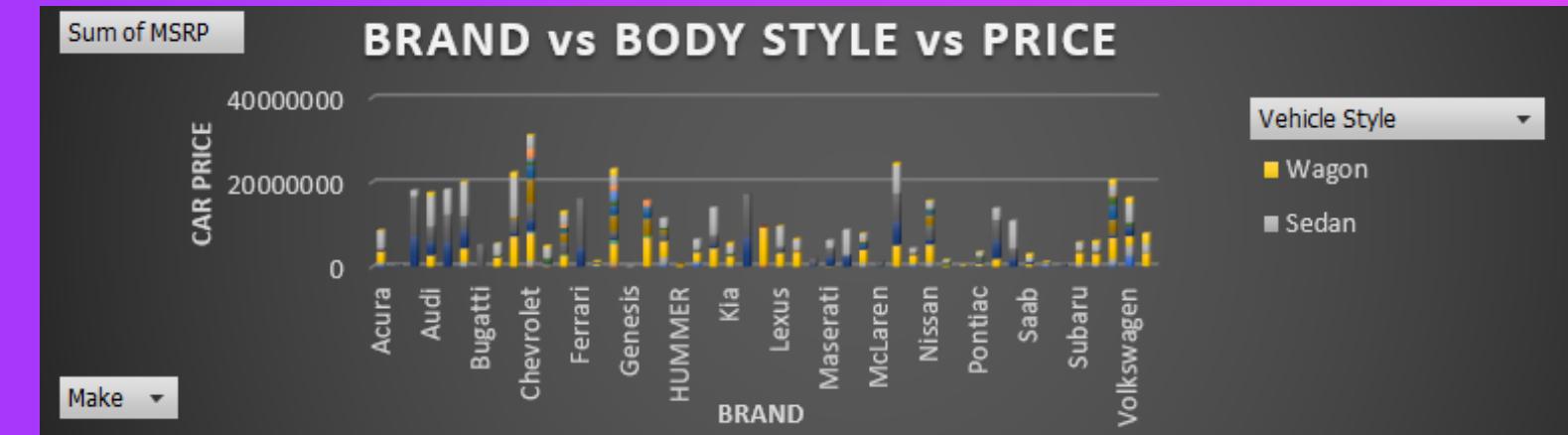


# DEDUCTION FROM TASK 5

- *The scatter plot and correlation coefficient (-0.6147) reveal a clear negative relationship between the number of cylinders in a car's engine and its highway miles per gallon (MPG).*
- *In simple terms, as the number of cylinders increases, the highway MPG generally decreases, indicating that more powerful engines tend to be less fuel-efficient on the highway.*
- *The negative slope of the trendline on the scatter plot indicates a clear inverse relationship between the number of cylinders and highway MPG.*
- *As the number of cylinders in a car's engine increases, the highway MPG tends to decrease.*

# DASHBOARD

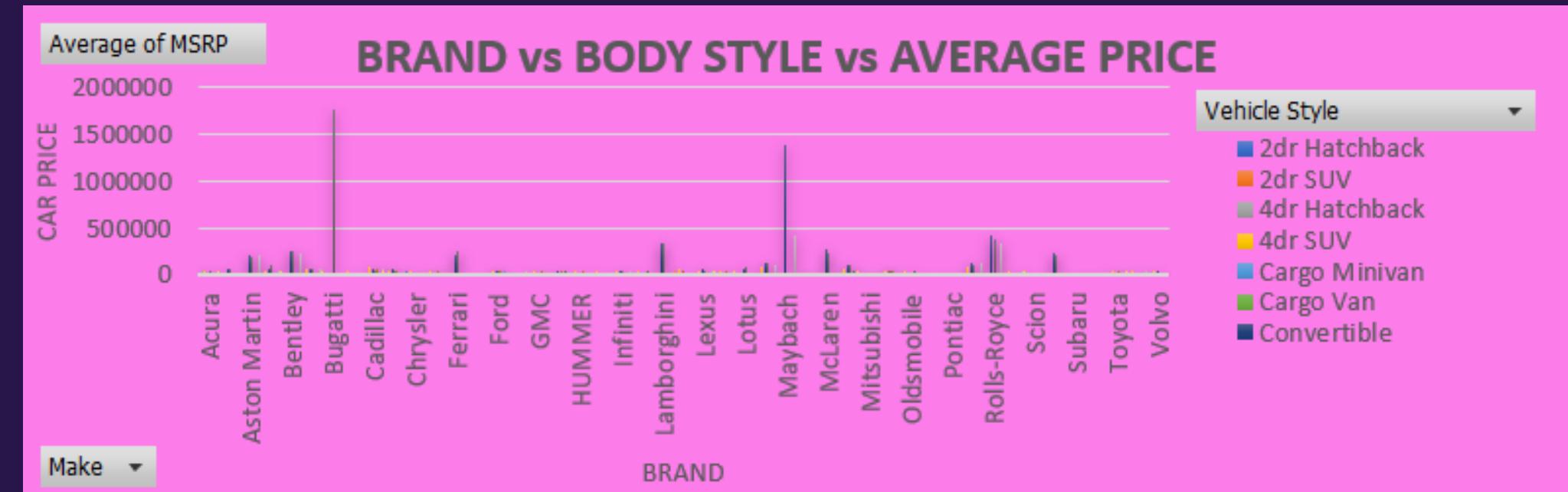
# Task 1: How does the distribution of car prices vary by brand and body style?



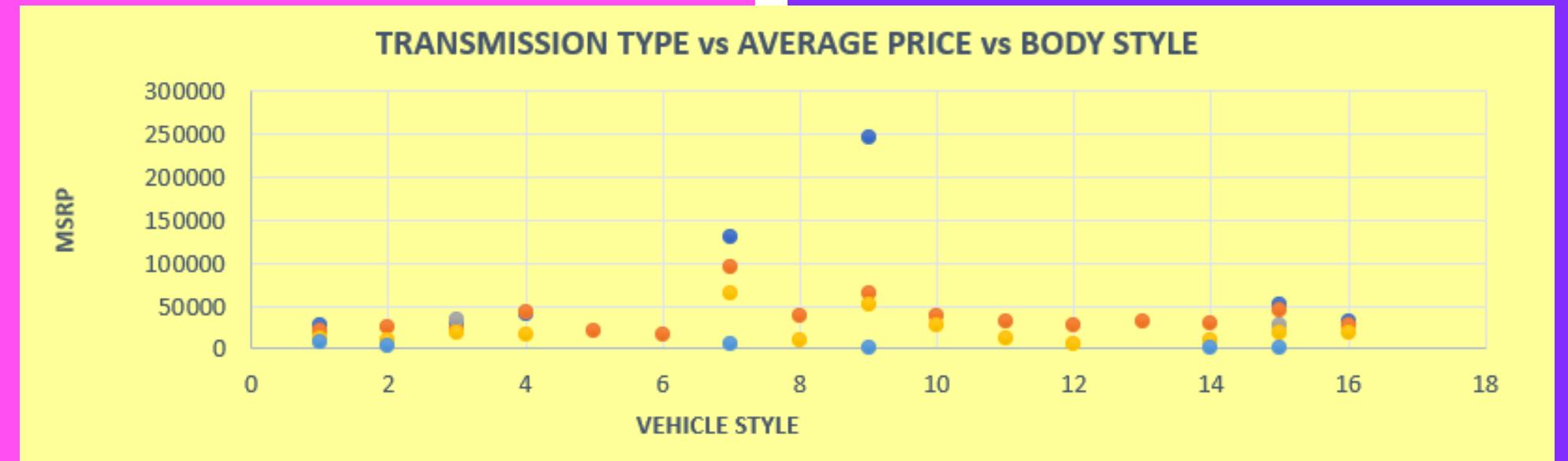
## Deduction

- *Chevrolet offers a diverse range of vehicle styles, including sedans, SUVs, trucks, and more, providing customers with a wide array of choices.*
- *In contrast, brands like Alfa Romeo, Tesla, Bugatti, and Genesis focus on a single style of vehicle in their lineup, offering simplicity but limited variety to consumers.*

## Task 2: Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?



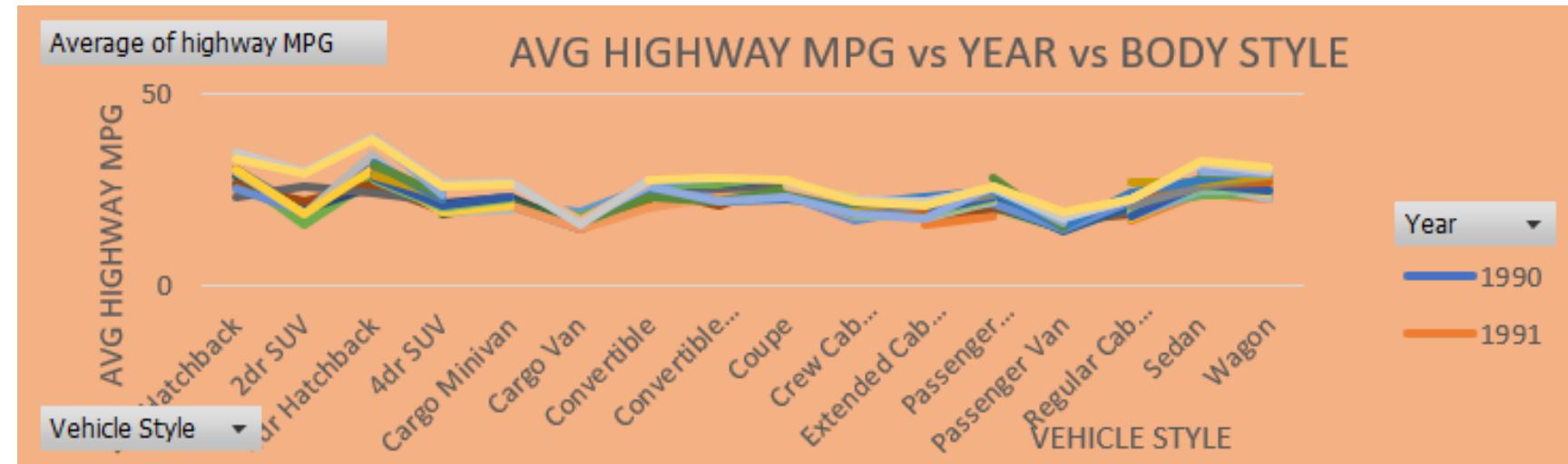
**Task 3: How do the different feature such as transmission type affect the MSRP, and how does this vary by body style?**



## Deduction

- Cars with automated manual transmissions tend to be the most expensive among all types of transmissions. These vehicles often come at higher price points.
- On average, cars with unspecified or unknown transmission types usually have lower prices. These cars are often more affordable.
- Automatic transmissions are commonly used across various car body styles, so you can find them in a wide range of vehicles, from sedans to SUVs.

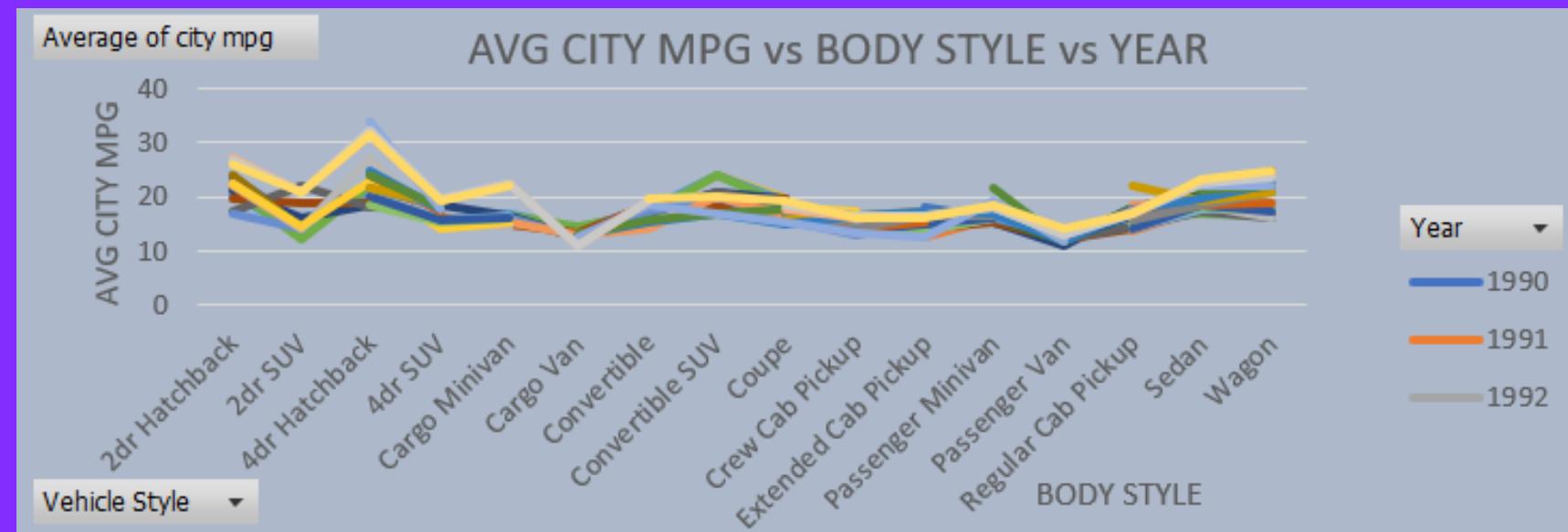
## **Task 4:(For Highway MPG) How does the fuel efficiency of cars vary across different body styles and model years?**



### **Deduction**

- Among the listed model years, cars from 2016 have the best average miles per gallon (MPG) across all types of cars. This means they are more fuel-efficient.
- Over the years, the 4-door hatchback model consistently has the highest average MPG compared to other car models. This shows that 4-door hatchbacks, regardless of the manufacturer, are fuel-efficient and a popular choice for people who want to save on fuel costs.

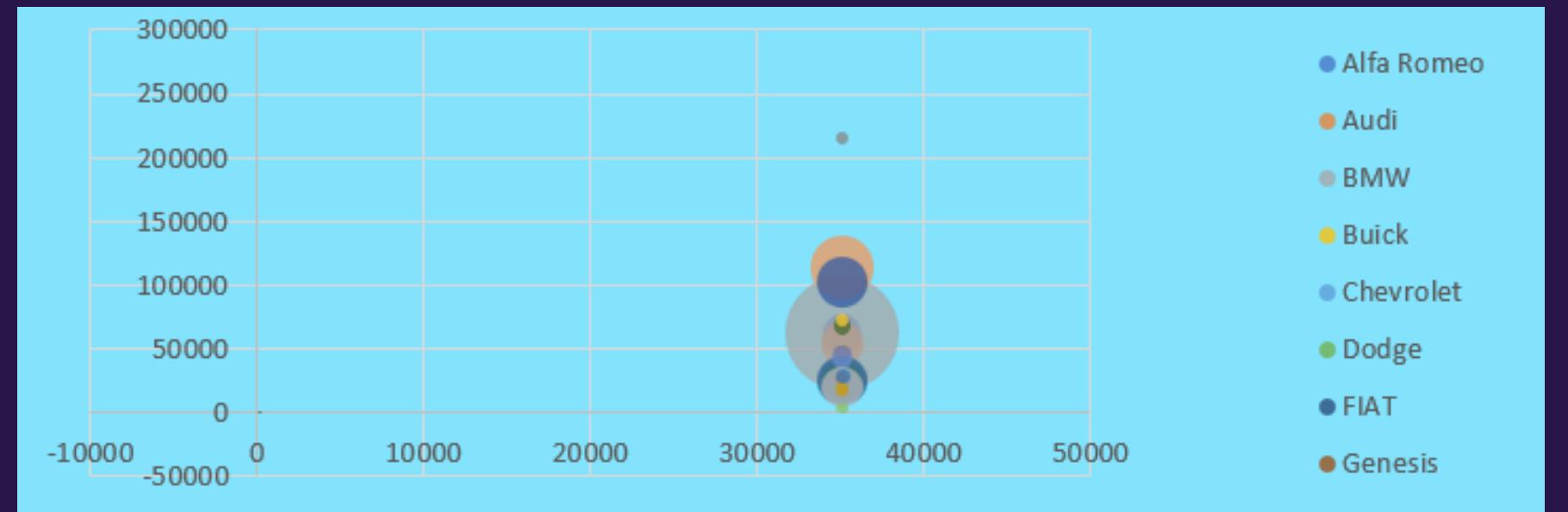
**Task 4:(For city MPG) How does the fuel efficiency of cars vary across different body styles and model years?**



## Deduction

- Among the model years listed, cars from 2016 are the most fuel-efficient, meaning they can travel a longer distance on a gallon of fuel.
- Regardless of the car's make or brand, 4-door hatchback models consistently offer superior fuel efficiency over the years.
- This makes them a top choice for individuals who prioritize saving money on fuel.

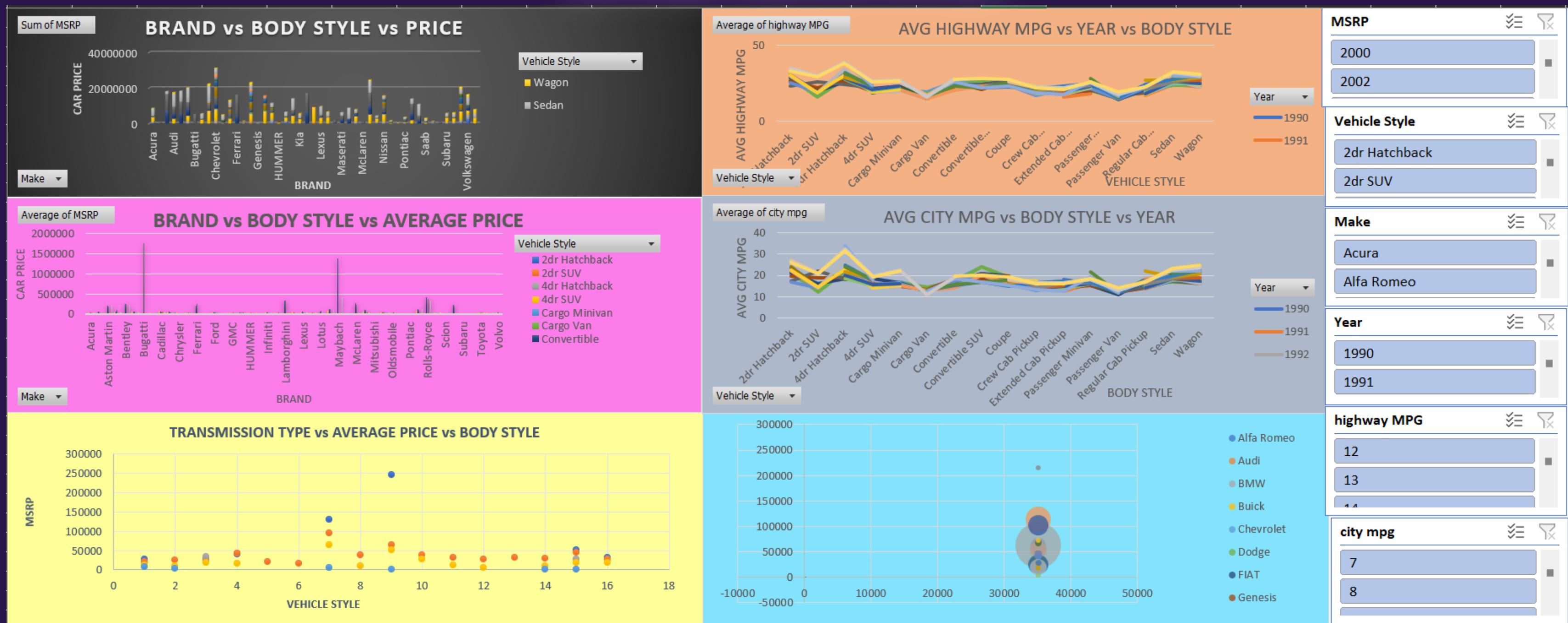
## Task 5: How does the car's horsepower, MPG, and price vary across different Brands?



### Deduction

- Tesla is the best at saving fuel because their electric cars are super eco-friendly.
- Bugatti makes really fast cars with the most powerful engines for thrilling rides.
- Bugatti also sells super expensive luxury cars for rich customers who want top-notch quality and exclusivity.

# DASHBOARD



**LINK FOR EXCEL SHEET & DASHBOARD**

[https://docs.google.com/spreadsheets/d/1ph-sMPsxnNSvODqkF4C4sTSuLPFUHH49/edit?  
usp=sharing&touid=101394161962274505358&rtpof=true&sd=true](https://docs.google.com/spreadsheets/d/1ph-sMPsxnNSvODqkF4C4sTSuLPFUHH49/edit?usp=sharing&touid=101394161962274505358&rtpof=true&sd=true)

# RESULTS

- **Smart Product Planning:**

*Identify Customer Preferences: Understand what customers really want in their cars.*

*Focus on Key Features: Pay special attention to the features and types of cars that affect prices the most.*

- **Precise Targeting:**

*Tailor to Customer Groups: Customize prices and car models for specific groups of customers.*

*Finding the Sweet Spot: Determine the ideal prices that make good profits while keeping customers interested.*

- **Staying Ahead of Competitors:**

*Profitable Choices: Figure out which cars are making the most money.*

*Outsmarting the Competition: Improve pricing and car designs to beat other car companies.*

- **Informed Decision-Making:**

*Getting Stronger, Growing Profits, Leading the Way*

# ENTIRE PROJECT DRIVE LINK

[https://drive.google.com/drive/folders/199kSE-5gSMvQWAy8qqjAlsbeA1oCmtJ4?  
usp=sharing](https://drive.google.com/drive/folders/199kSE-5gSMvQWAy8qqjAlsbeA1oCmtJ4?usp=sharing)

# THANK YOU!