Analyzing the Impact of Car Features on Price & Profitability

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PROJECT OVERVIEW

- The automotive industry has witnessed significant transformations driven by factors such as fuel efficiency, environmental concerns, and technological advancements. Amidst fierce competition and evolving consumer preferences, understanding the dynamics of consumer demand is paramount for manufacturers seeking sustained success.
- This project aims to analyze the relationship between a car's features, market category, and pricing, and identify the key factors that affect profitability and consumer demand.
- Given a comprehensive dataset, the key question posed by our client, a leading car manufacturer, is: How can we strategically set prices and develop products to enhance profitability while meeting consumer demand?

ANALYSIS APPROACH

To gain insights and address the problem, we will:

- Explore trends in car features and pricing over time
- Analyze the relationship between engine power, fuel efficiency, and pricing.
- Identify the most important features influencing a car's price
- Examine pricing variations across manufacturers and market categories.
- Develop an interactive dashboard to visualize the findings.
- By leveraging advanced Excel skills, regression analysis, and data visualization techniques, we aim to provide valuable insights to support informed pricing and product development decisions.
- This presentation structure provides an overview of the project, outlines the problem statement, describes the dataset, and explains the analysis approach. It sets the stage for the subsequent slides, which will delve into the specific analyses, findings, and recommendations

TECH STACK USED

- Microsoft Excel 2020: Used for data analysis, manipulation, and visualization. Excel provides a wide range of functionalities for working with data, including formulas, charts, and pivot tables.
- Microsoft PowerPoint: Utilized for creating presentations to showcase your analysis results, findings, and insights. PowerPoint offers tools for designing visually appealing slides and presenting information in a structured manner.

TASK 1 – POPULARITY OF CAR MODEL

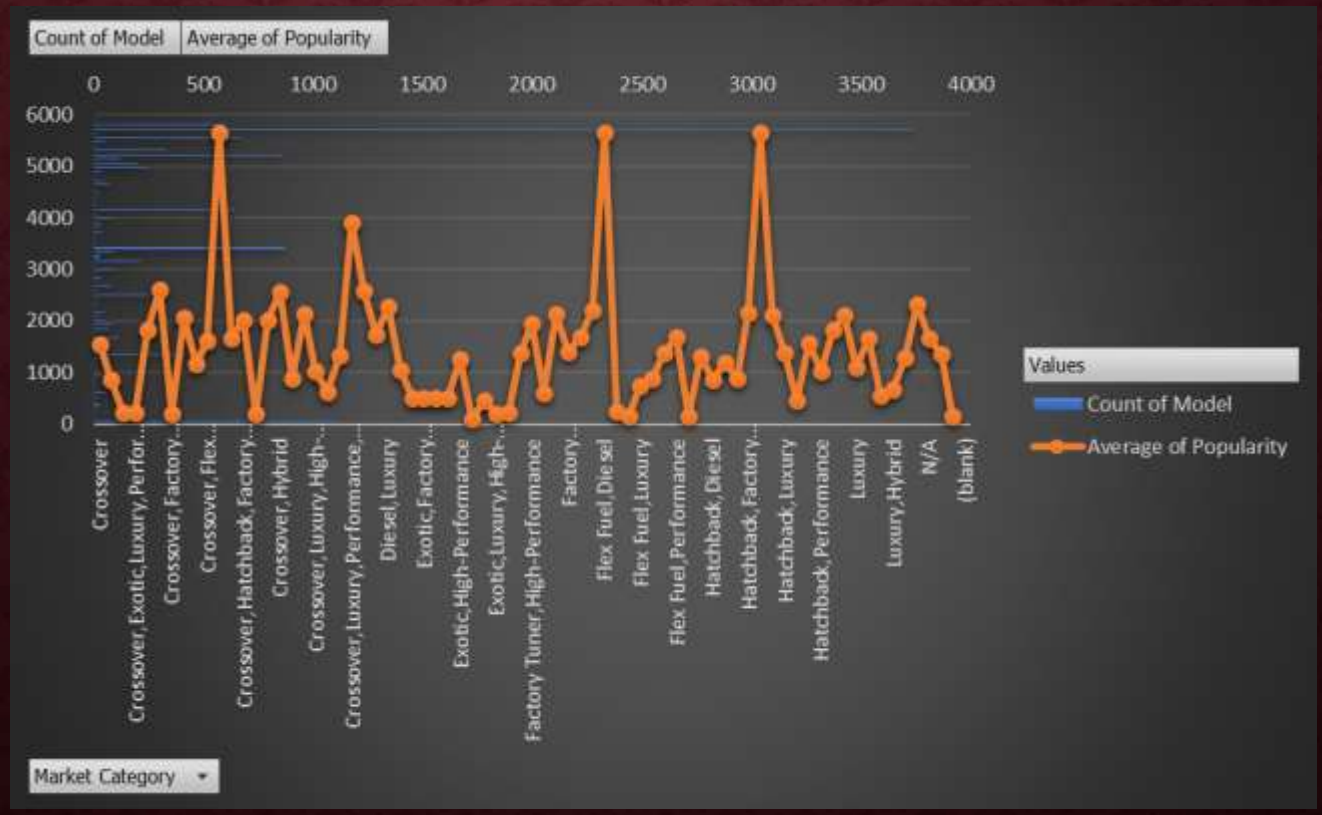
- **Task 1.A:** Create a pivot table that shows the number of car models in each market category and their corresponding popularity scores.

- **Insight :** Top 20 Market Category Popularity of Cars

Market Category	Count of Model	Sum of Popularity
Crossover	1110	1715242
Crossover,Luxury	410	362665
Crossover,Luxury,Performance	113	151968
Diesel	84	145396
Exotic,High-Performance	261	331818
Exotic,Luxury,High-Performance	79	36899
Factory Tuner,High-Performance	106	205790
Factory Tuner,Luxury,High-Performance	215	458674
Factory Tuner,Performance	92	156004
Flex Fuel	872	1933488
Flex Fuel,Performance	87	146201
Hatchback	641	845393
Hatchback,Performance	252	261991
High-Performance	199	362468
Hybrid	123	258985
Luxury	855	942772
Luxury,High-Performance	334	557118
Luxury,Performance	673	869930
N/A	3742	6274920
Performance	601	810673
Grand Total	10849	16828395

TASK 1 – POPULARITY OF CAR MODEL

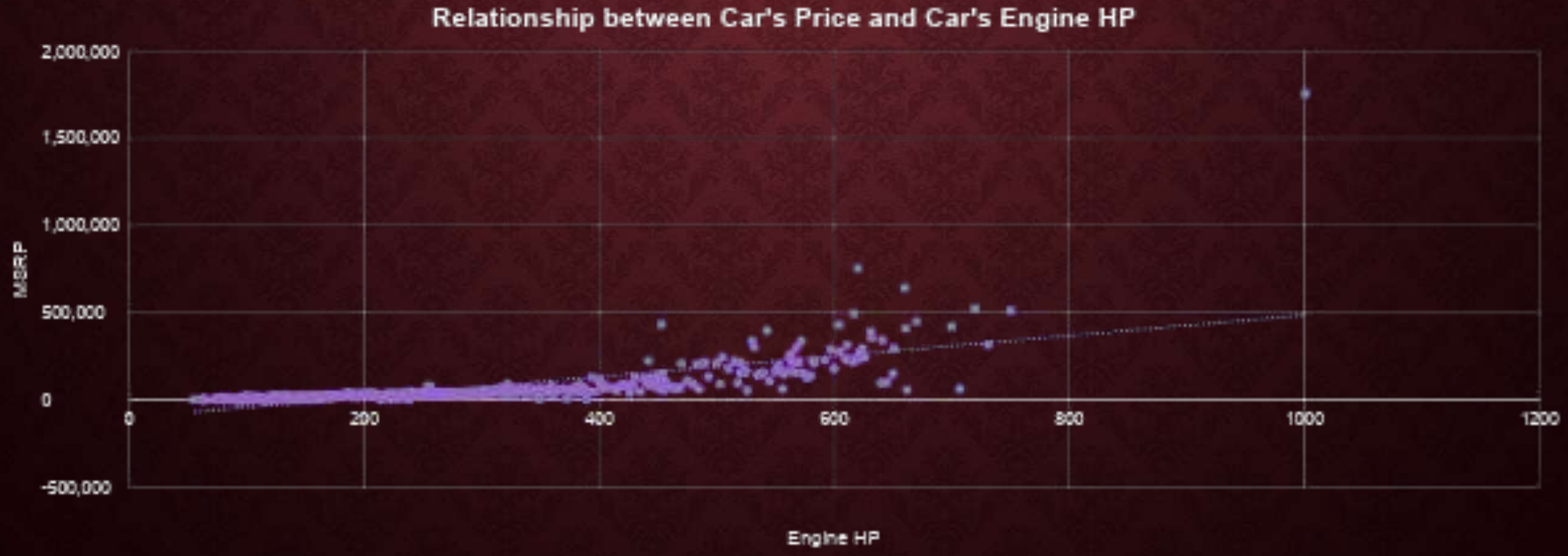
- **Task 1.B:** Create a combo chart that visualizes the relationship between market category and popularity.
- **Insight :** The Most Popular Category of Cars is Hatchback, Flex Fuel/Diesel, Crossover and Luxury Cars.



TASK 2 - RELATIONSHIP BETWEEN A CAR'S ENGINE POWER AND ITS PRICE?

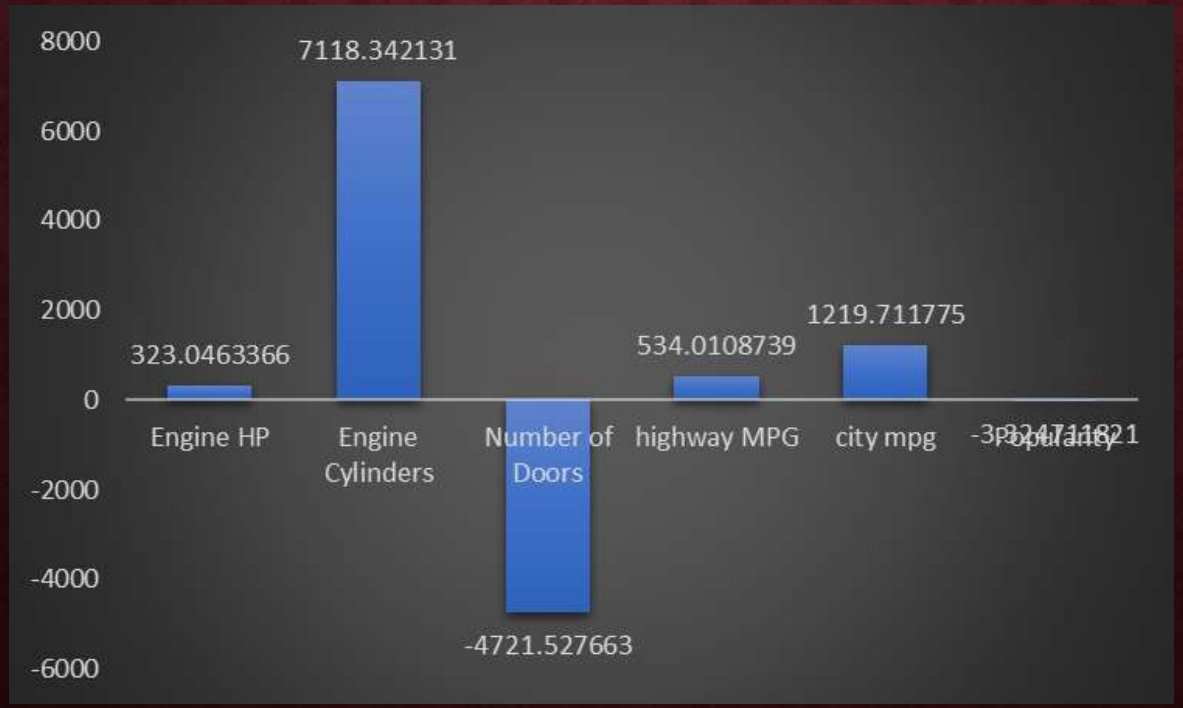
- **Task 2:** Create a scatter chart that plots engine power on the x-axis and price on the y-axis. Add a trendline to the chart to visualize the relationship between these variables.

- **Insight :** Below is the Scatter Chart Plot which shows that as the Engine Power i.e HP Increases Prices also increases and can say that it is directly proportional.



TASK 3 -WHICH FEATURES ARE MOST IMPORTANT FOR DETERMINING PRICE?

- **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.
- **Insight:** The Features which is important with respect to price is Engine Cylinders,and city MPG and then Least is Number of Doors. That is why Cars which are expensive like Sports Car are the Costliest.



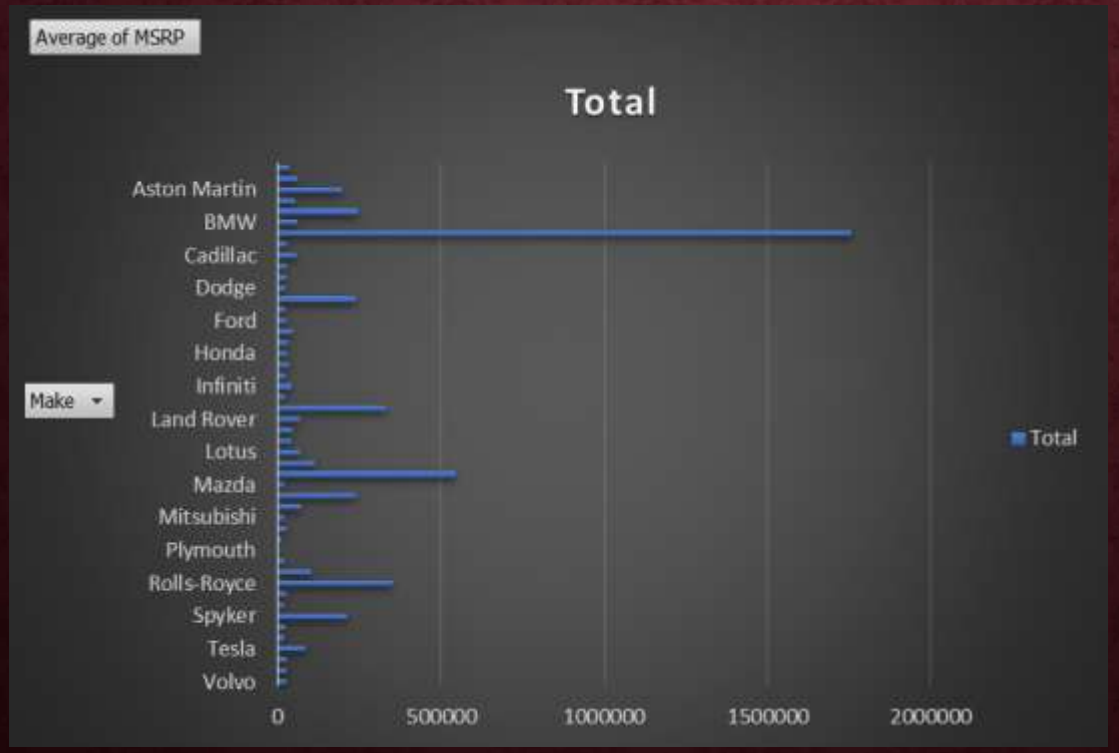
TASK 4 - AVERAGE PRICE BY MANUFACTURER

- **Task 4.A:** Create a pivot table that shows the average price of cars for each manufacturer.
- **Insight :** Below is the List of Average Price of Cars of Each Manufacturer or Maker, where Bugatti is the Most Expensive Car Maker by Average Price.

Row Labels	Average of MSRP
Tesla	85315.38462
Spyker	213323.3333
Rolls-Royce	351130.6452
Porsche	101622.3971
Mercedes-Benz	71476.22946
McLaren	239805
Maybach	546221.875
Maserati	114207.7069
Lotus	69188.27586
Lincoln	42839.82927
Lexus	47549.06931
Land Rover	67823.21678
Lamborghini	331567.3077
Infiniti	42394.21212
HUMMER	36464.41176
Genesis	46616.66667
Ferrari	237383.8235
Cadillac	56231.31738
Bugatti	1757223.667
BMW	61546.76347
Bentley	247169.3243
Audi	53452.1128
Aston Martin	197910.3763
Alfa Romeo	61600
Acura	34887.5873
Grand Total	82405.28755

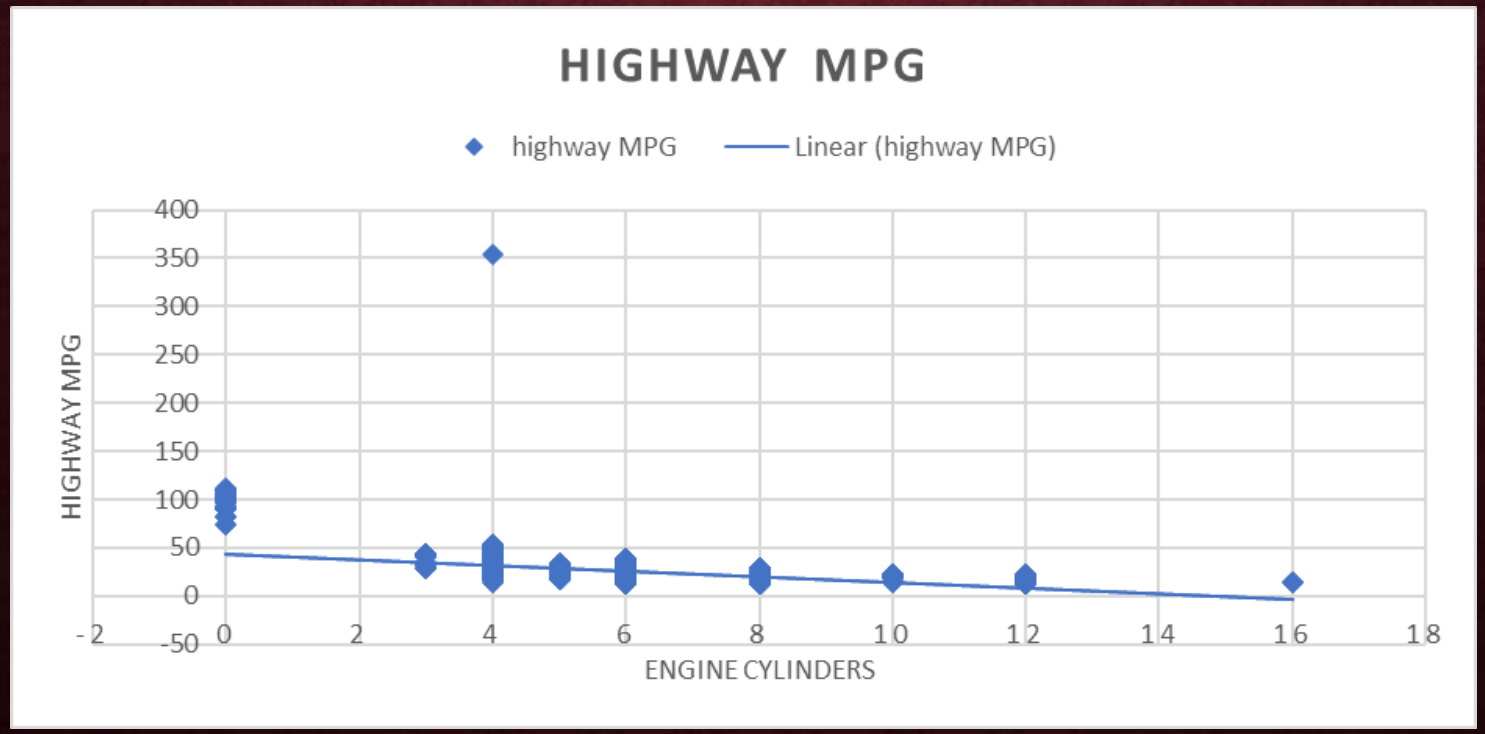
TASK 4 - AVERAGE PRICE BY MANUFACTURER

- **Task 4.B:** Create a bar chart or a horizontal stacked bar chart that visualizes the relationship between manufacturer and average price.
- **Insight :** As per the Analysis, Bugatti has the Most Expensive Average Price of Cars followed by Maybach, Rolls-Royce and Least expensive is Plymouth, Suzuki



TASK 5- RELATIONSHIP BETWEEN FUEL EFFICIENCY AND ENGINE CYLINDERS

- **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
- **Insight :** As per the Analysis, When the Engine Cylinders are Higher then the Highway MPG is Lower because More Cylinders More Powerful Engine thus Lower MPG

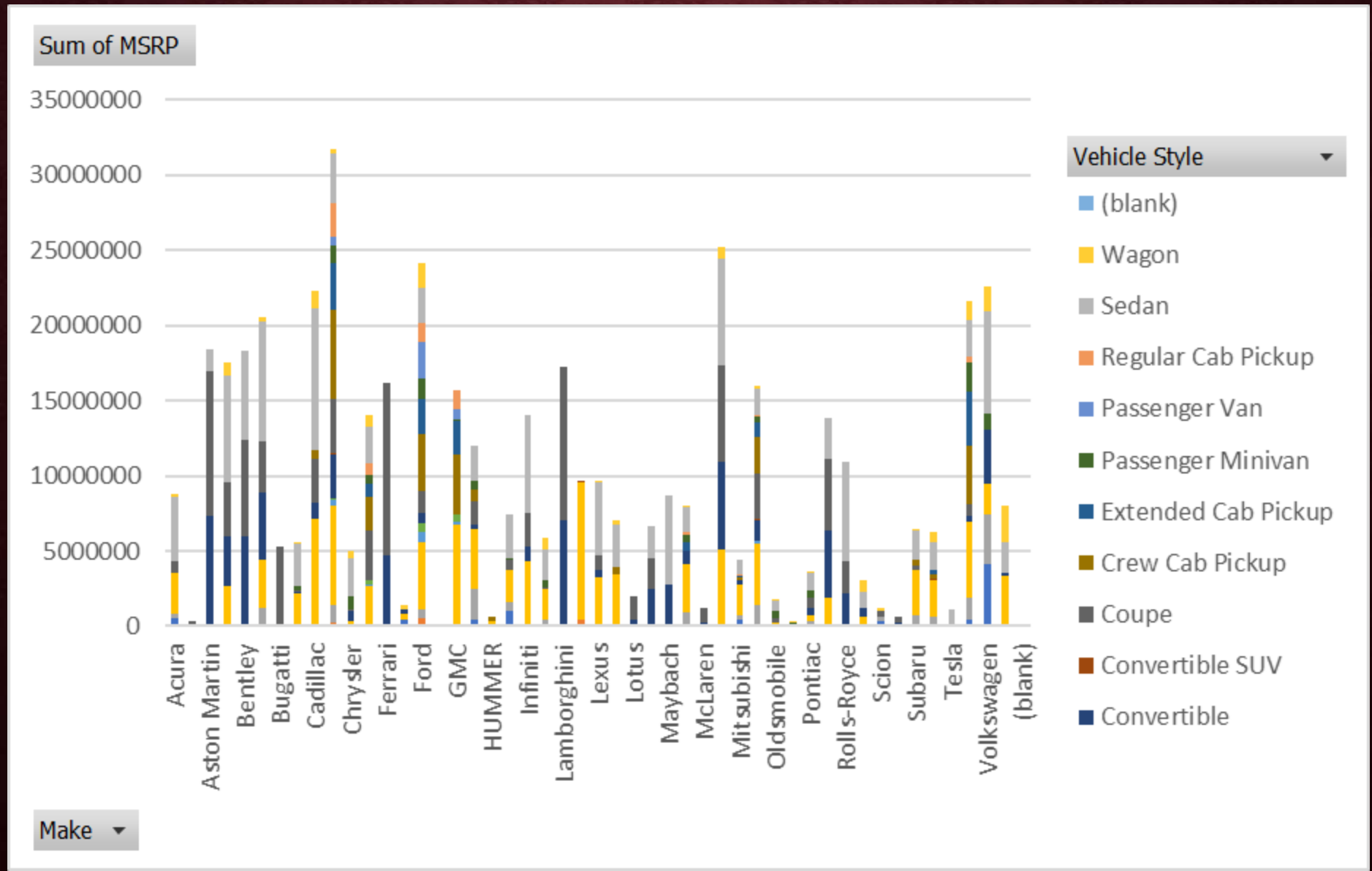


TASK 5- RELATIONSHIP BETWEEN FUEL EFFICIENCY AND ENGINE CYLINDERS

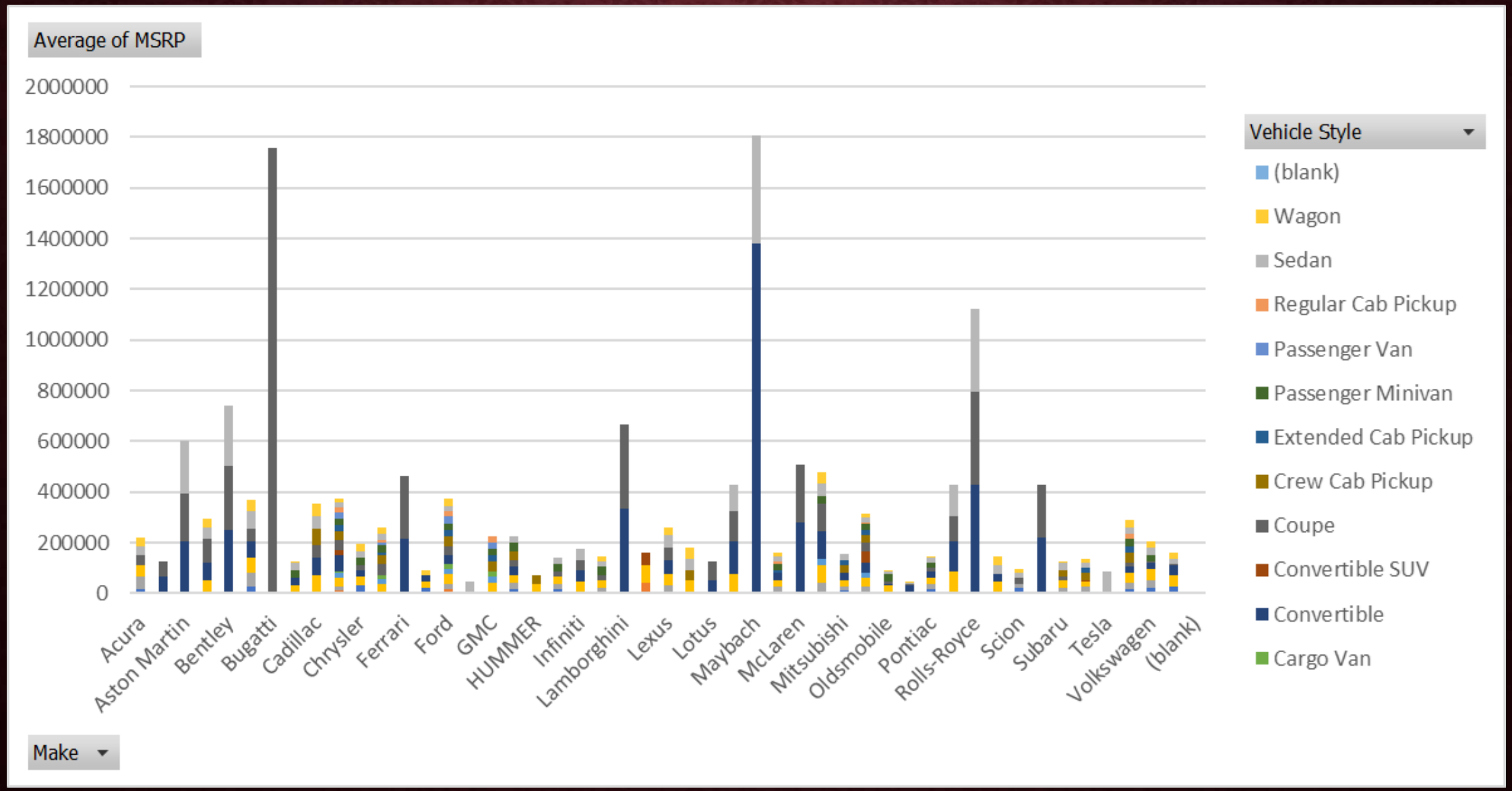
- Task 5.B: Calculate the correlation coefficient between the number of cylinders and highway MPG to quantify the strength and direction of the relationship.
- Insight: -0.621572015 Correlation

Building the Dashboard

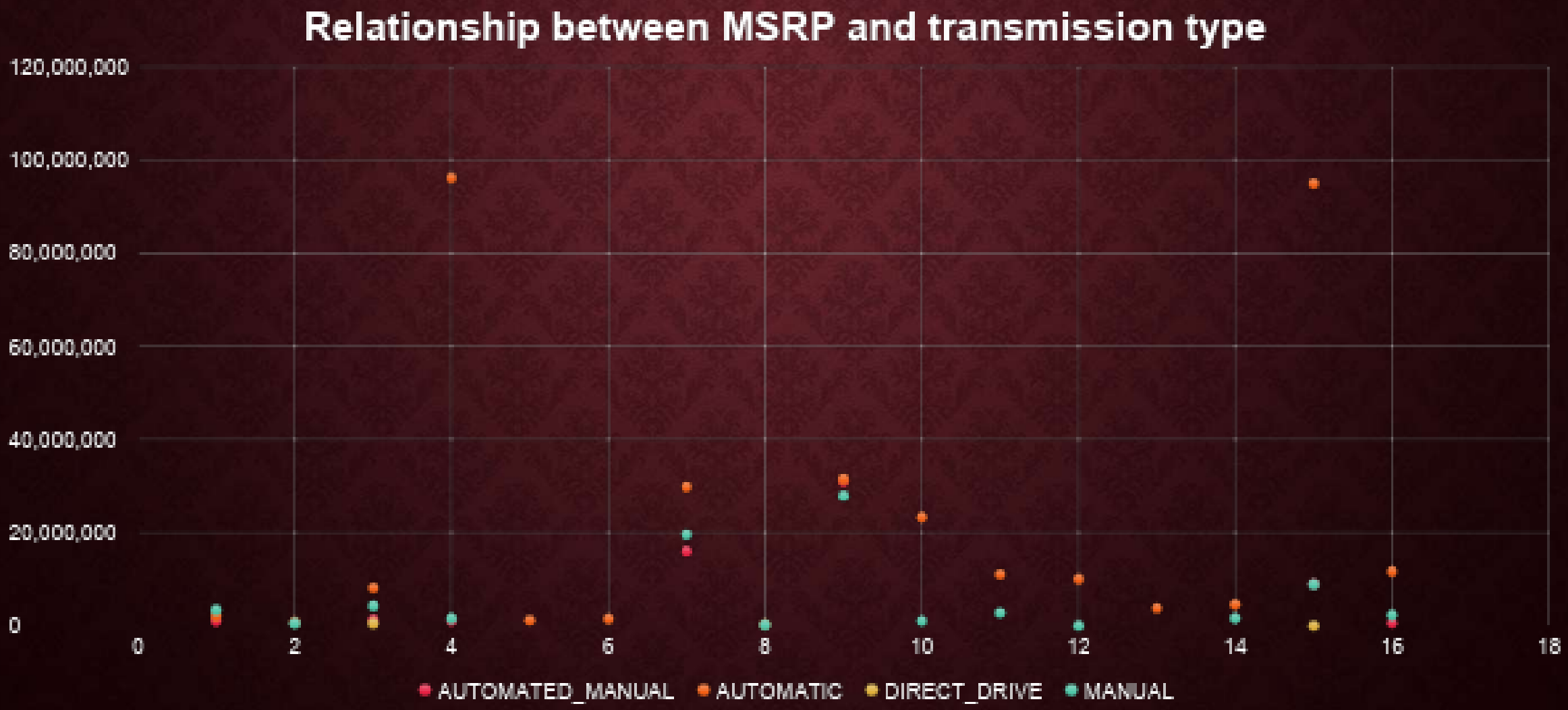
Task 1: How does the distribution of car prices vary by brand and body style?



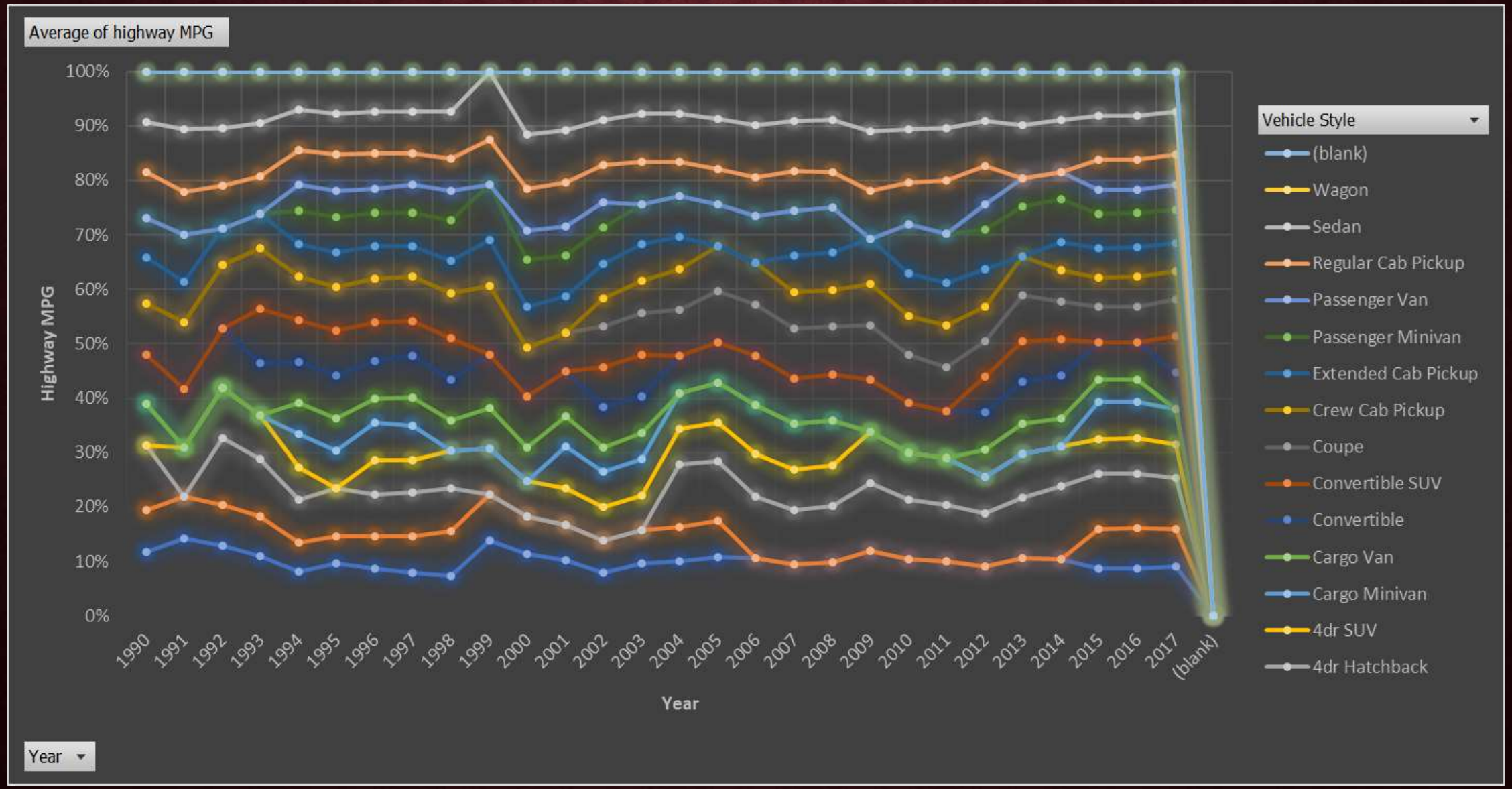
Task 2: Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?



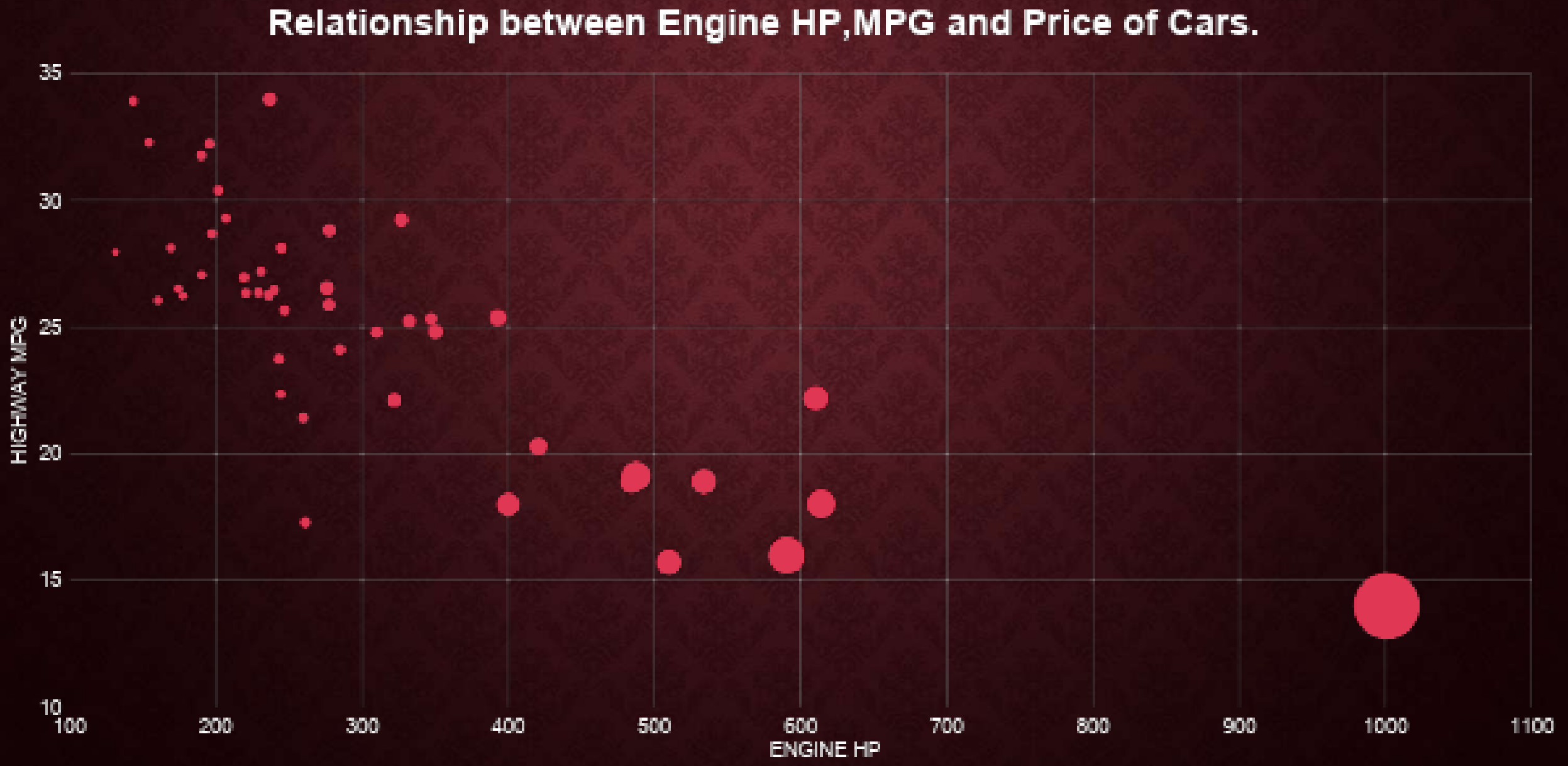
Task 3: How do the different feature such as transmission type affect the MSRP, and how does this vary by body style?



Task 4: How does the fuel efficiency of cars vary across different body styles and model years?



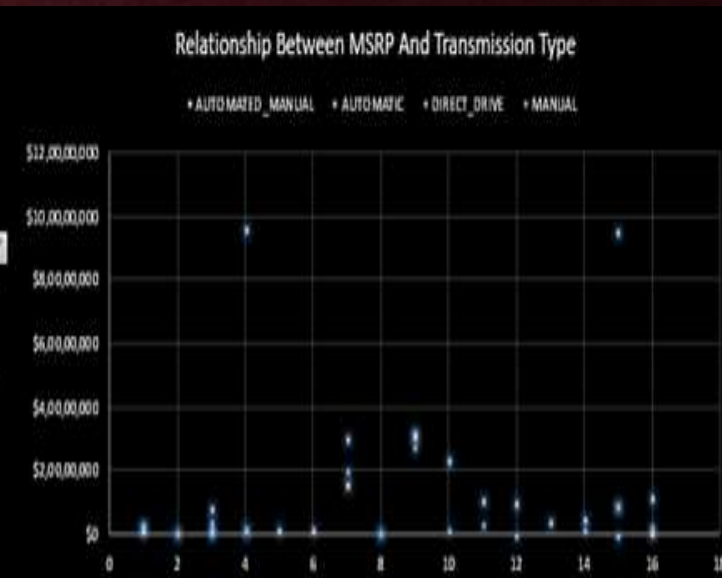
Task 5: How does the car's horsepower, MPG, and price vary across different Brands?

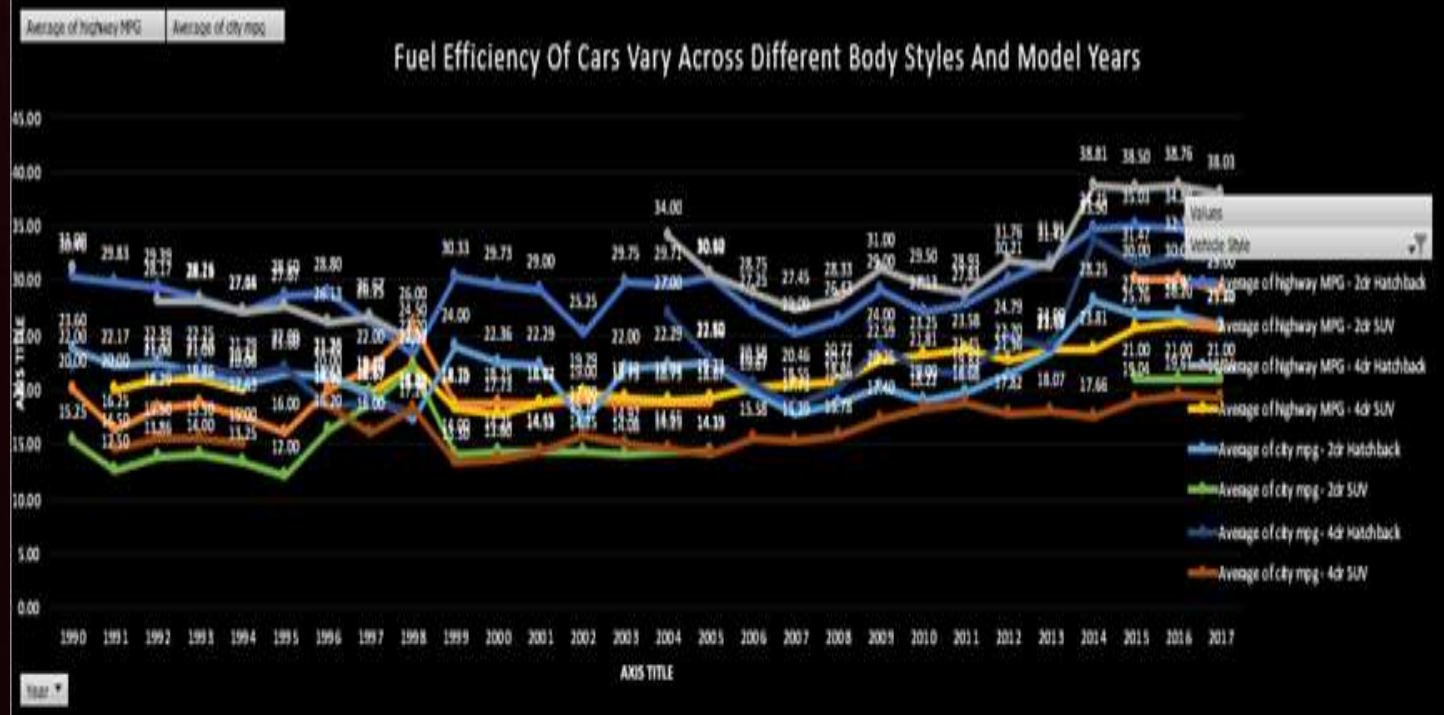


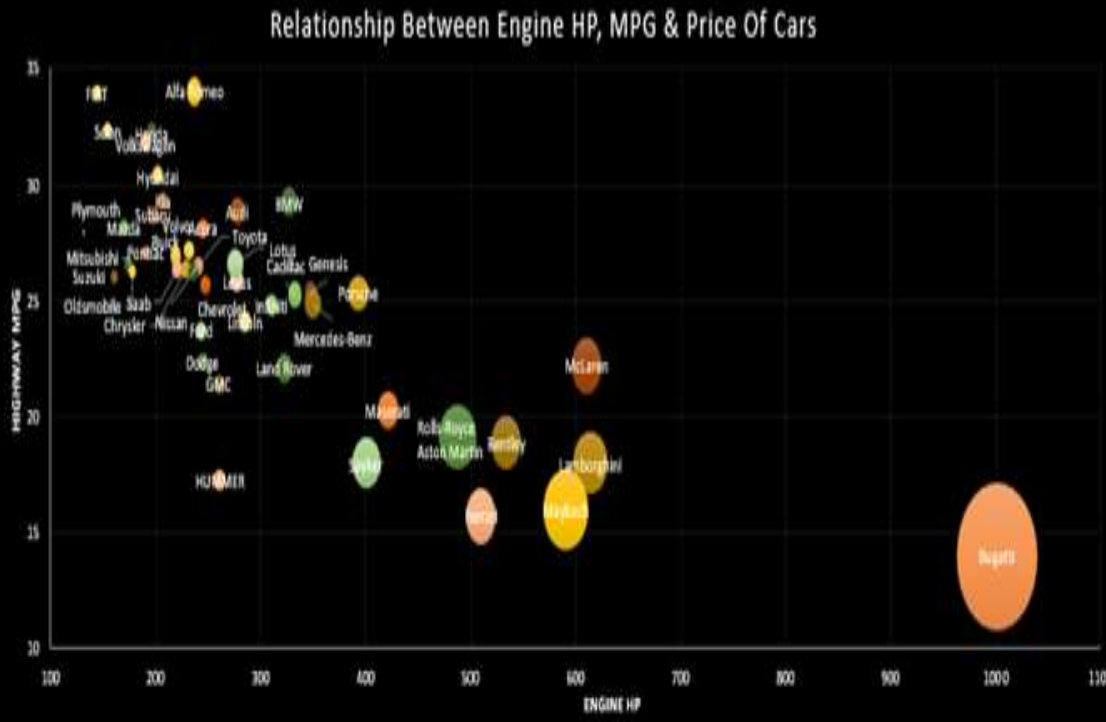
Dashboard


Sum of MSRP
Distribution of Car Price by Brand and Body Style
Vehicle Style
4dr SUV
4dr Hatchback
2dr SUV
2dr Hatchback
Male


Sum of MSRP
Average Price of Car and Body Style
AXIS TITLE
Vehicle Style
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Male


Relationship Between MSRP And Transmission Type
AUTOMATED_MANUAL
AUTOMATIC
DIRECT_DRIVE
MANUAL


Average of highway MPG
Average of city mpg
Fuel Efficiency Of Cars Vary Across Different Body Styles And Model Years
Values
Vehicle Style
Average of highway MPG - 2dr Hatchback
Average of highway MPG - 2dr SUV
Average of highway MPG - 4dr Hatchback
Average of highway MPG - 4dr SUV
Average of city mpg - 2dr Hatchback
Average of city mpg - 2dr SUV
Average of city mpg - 4dr Hatchback
Average of city mpg - 4dr SUV
AXIS TITLE
Year


Relationship Between Engine HP, MPG & Price Of Cars
HIGHWAY MPG
ENGINE HP

RESULT & CONCLUSION

- **Popular Car Categories:** The most popular categories of cars based on our analysis are Hatchback, Flex Fuel/Diesel, Crossover, and Luxury Cars.

- **Price and Engine Power Relationship:** There is a direct proportionality between engine power (Horse Power) and car prices. As engine power increases, so do prices, indicating that consumers are willing to pay more for higher performance.

- **Key Features Impacting Price:** The most important features influencing car prices are Engine Cylinders and Engine HP (Power), followed by Vehicle Size. This explains why cars with expensive features like Sports Cars tend to be the costliest.

- **Average Price by Manufacturer:** Bugatti emerges as the most expensive car maker with an average price of $1,757,224 USD, while Plymouth offers the cheapest cars with an average price of $3,297 USD.

- **Engine Cylinders and MPG:** Analysis reveals that as engine cylinders increase, highway MPG decreases. This is because higher cylinder counts typically indicate more powerful engines, resulting in lower fuel efficiency.

- **Popular Car Category and Brand:** Sedan is identified as the most popular car category, with Chevrolet being the most popular brand among consumers.

- **Fuel Efficiency:** Passenger Vans exhibit the lowest fuel efficiency with an average MPG of 12.53, while 4dr Hatchback Cars show the highest fuel efficiency with an average MPG of 35.39.

- **Performance and Efficiency:** Bugatti boasts the highest HP with the lowest MPG, making it the most costly car maker. Conversely, Fiat has the lowest HP, while Alfa Romeo achieves the highest highway MPG. Plymouth stands out as the cheapest car maker overall.

- In conclusion, these insights offer valuable guidance for car manufacturers in understanding consumer preferences, optimizing pricing strategies, and focusing on key features to meet market demands effectively.

THANK YOU!

Excel Work