ANALYZING THE IMPACT OF CAR FEATURES ON PRICE AND PROFITABILITY

Final Project-3

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PROJECT DESCRIPTION:

- The automotive industry is undergoing significant changes due to fuel efficiency, environmental concerns, and technological advancements. Understanding consumer demand is essential for manufacturers aiming for long-term success.
- This project will analyze the relationship between a car's features, market category, and pricing to identify key factors influencing profitability and consumer demand. Our client, a leading car manufacturer, asks: How can we set prices and develop products to boost profitability while meeting consumer needs?

APPROACH:

- 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: Used for data analysis, manipulation, and visualization. Excel provides various functionalities for working with data, including formulas, charts, and pivot tables.

Microsoft Excel

ANALYSIS

TASK 1 – POPULARITY OF CAR MODEL:

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

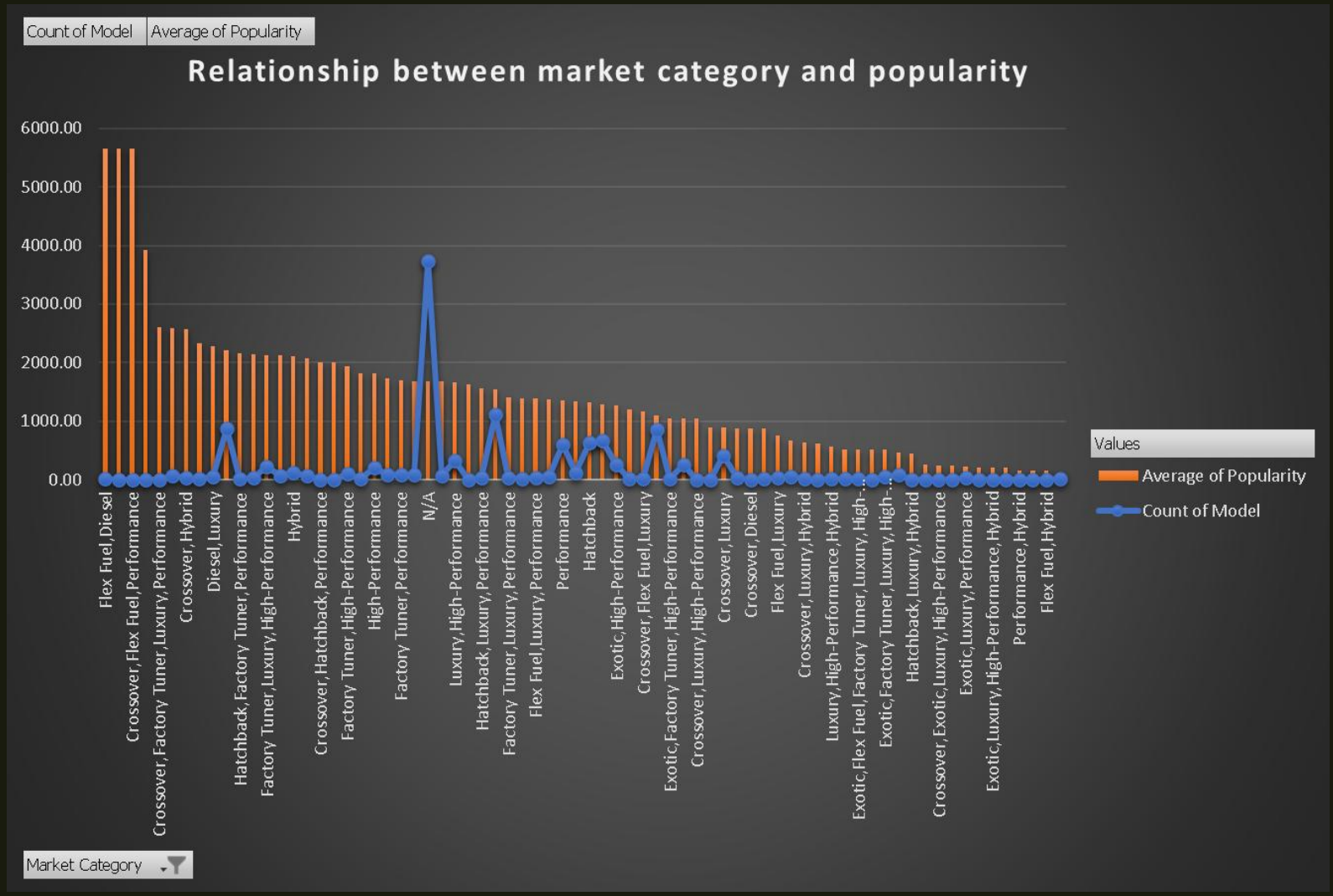
Insight : Top 20 Market Category Popularity of Cars

CATEGORY	Count of Model	Average of Popularity
Flex Fuel	872	2217.30
Factory Tuner,Luxury,High-Performance	215	2133.37
Hybrid	123	2105.57
Factory Tuner,High-Performance	106	1941.42
High-Performance	199	1821.45
Diesel	84	1730.90
Factory Tuner,Performance	92	1695.70
Flex Fuel,Performance	87	1680.47
N/A	3742	1676.89
Luxury,High-Performance	334	1668.02
Crossover	1110	1545.26
Performance	601	1348.87
Crossover,Luxury,Performance	113	1344.85
Hatchback	641	1318.87
Luxury,Performance	673	1292.62
Exotic,High-Performance	261	1271.33
Luxury	855	1102.66
Hatchback,Performance	252	1039.65
Crossover,Luxury	410	884.55
Exotic,Luxury,High-Performance	79	467.08
Grand Total	**10849**	**1551.14711**

TASK 1 – POPULARITY OF CAR MODEL:

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

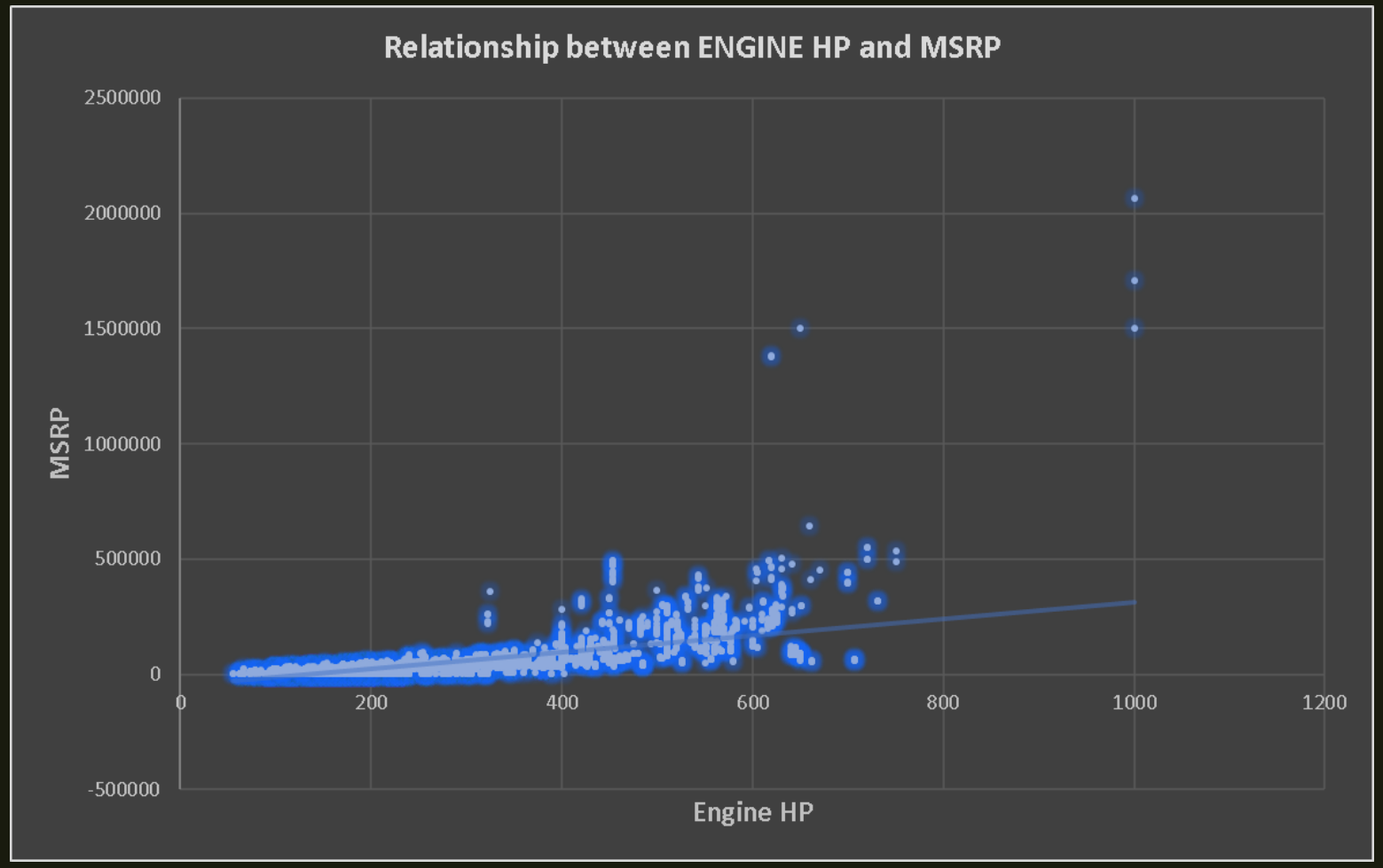
Insight : The Most Popular Category of Cars is Hatchback, Flex Fuel/Diesel, Crossover, and Luxury Cars.



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

Task : 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.

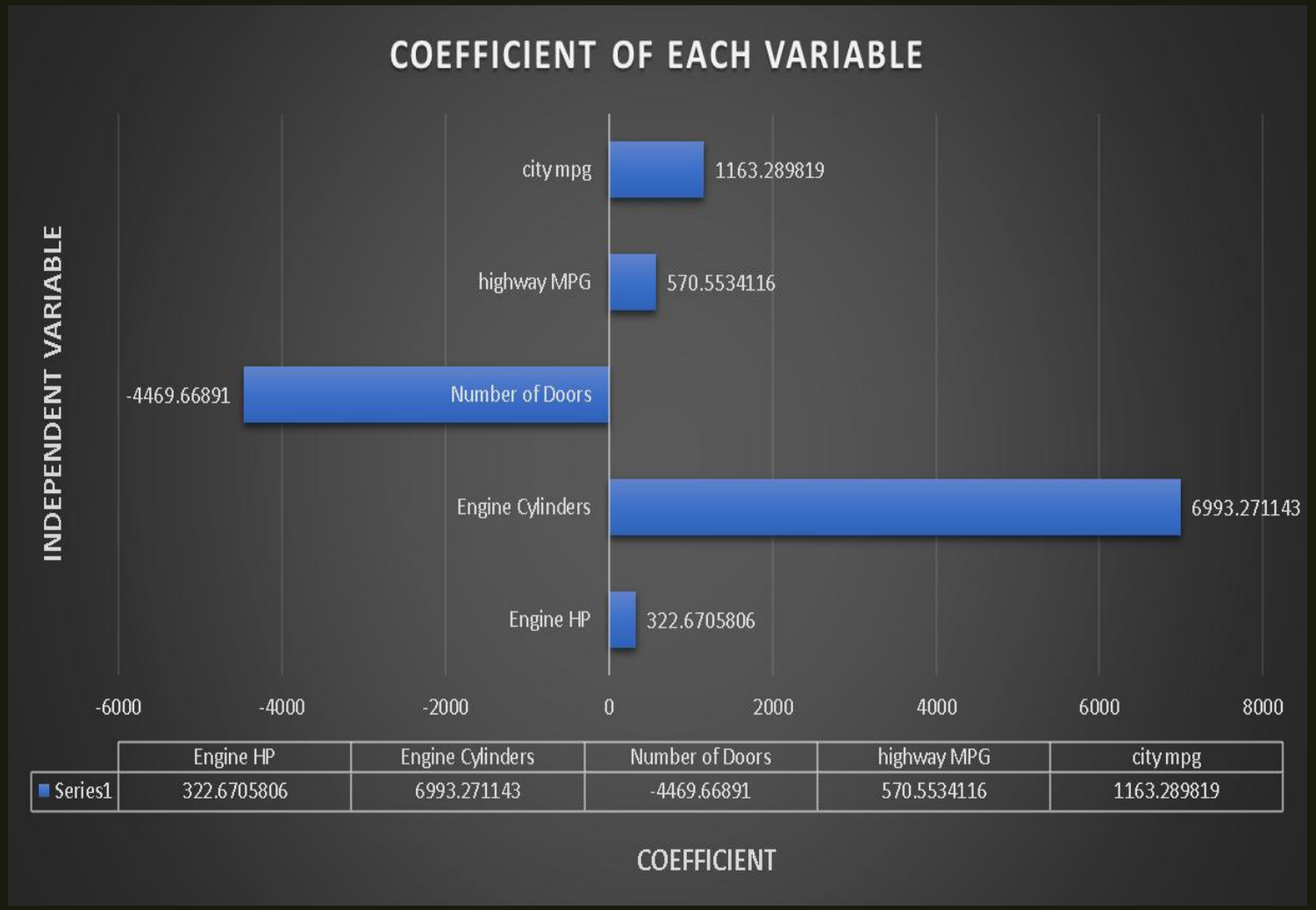
Insight : Below is the Scatter Chart Plot which shows that as the Engine Power i.e HP Increases Prices also increases and can say that it is directly proportional.



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

Task : 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 are Engine Cylinders, city mpg and the Least is number of doors. That is why Cars which are expensive like Sports Car are the Costliest.



TASK 4 - AVERAGE PRICE BY MANUFACTURER

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

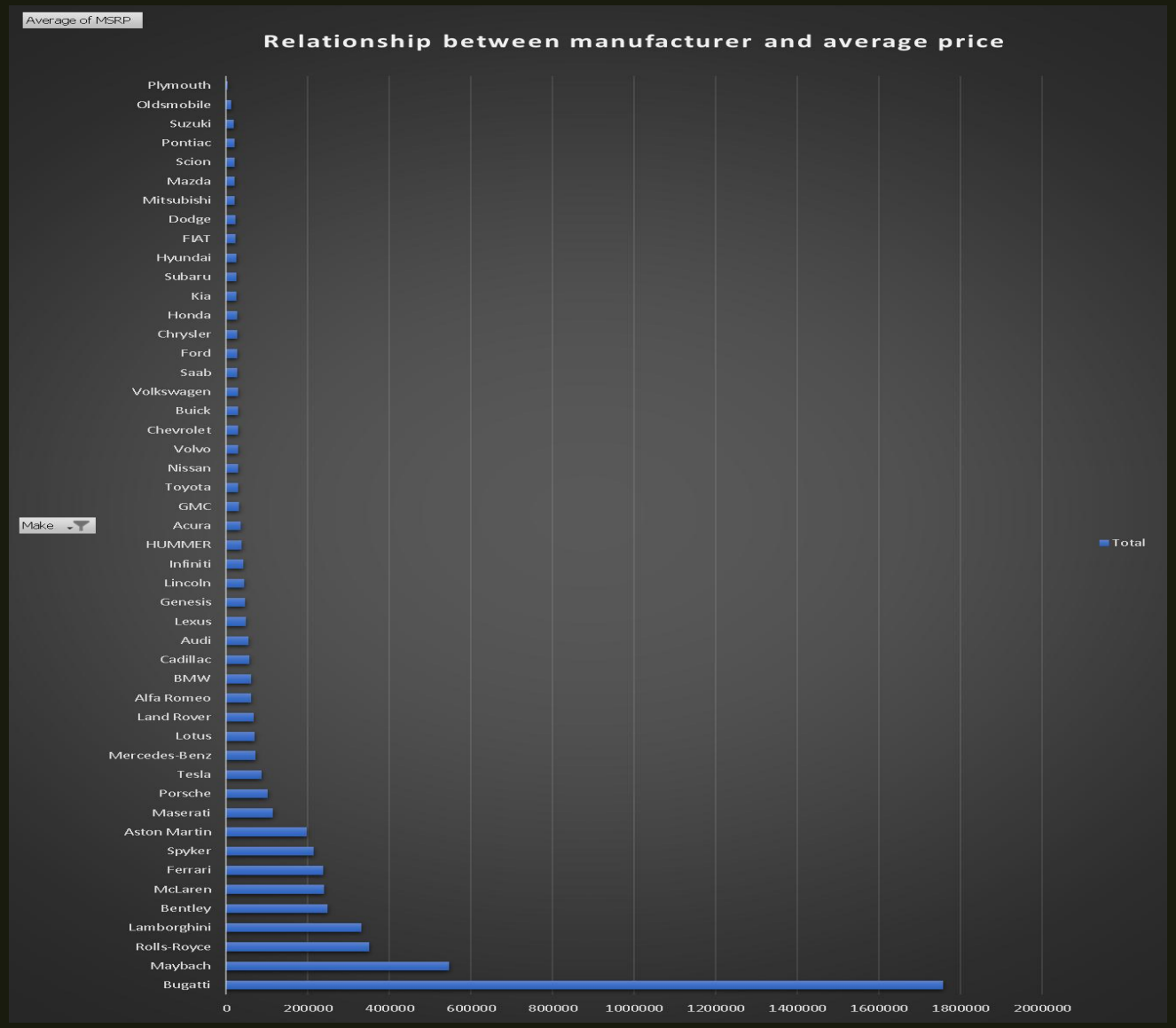
Insight : Bugatti is the Most Expensive Car Maker by Average Price.

MANUFACTURER	Average of MSRP
Bugatti	1757224
Maybach	546222
Rolls-Royce	351131
Lamborghini	331567
Bentley	247169
McLaren	239805
Ferrari	238219
Spyker	213323
Aston Martin	197910
Maserati	114208
Porsche	101622
Tesla	85256
Mercedes-Benz	71476
Lotus	69188
Land Rover	67823
Alfa Romeo	61600
BMW	61547
Cadillac	56231
Audi	53452
Lexus	47549
Genesis	46617
Lincoln	42840
Infiniti	42394
HUMMER	36464
Acura	34888
GMC	30493
Toyota	29030
Nissan	28583
Volvo	28541
Chevrolet	28350
Buick	28207
Volkswagen	28102
Saab	27414
Ford	27399
Chrysler	26723
Honda	26674
Kia	25310
Subaru	24828
Hyundai	24597
FIAT	22670
Dodge	22390
Mitsubishi	21241
Mazda	20039
Scion	19933
Pontiac	19322
Suzuki	17907
Oldsmobile	11543
Plymouth	3123
Grand Total	40595

TASK 4 - AVERAGE PRICE BY MANUFACTURER

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

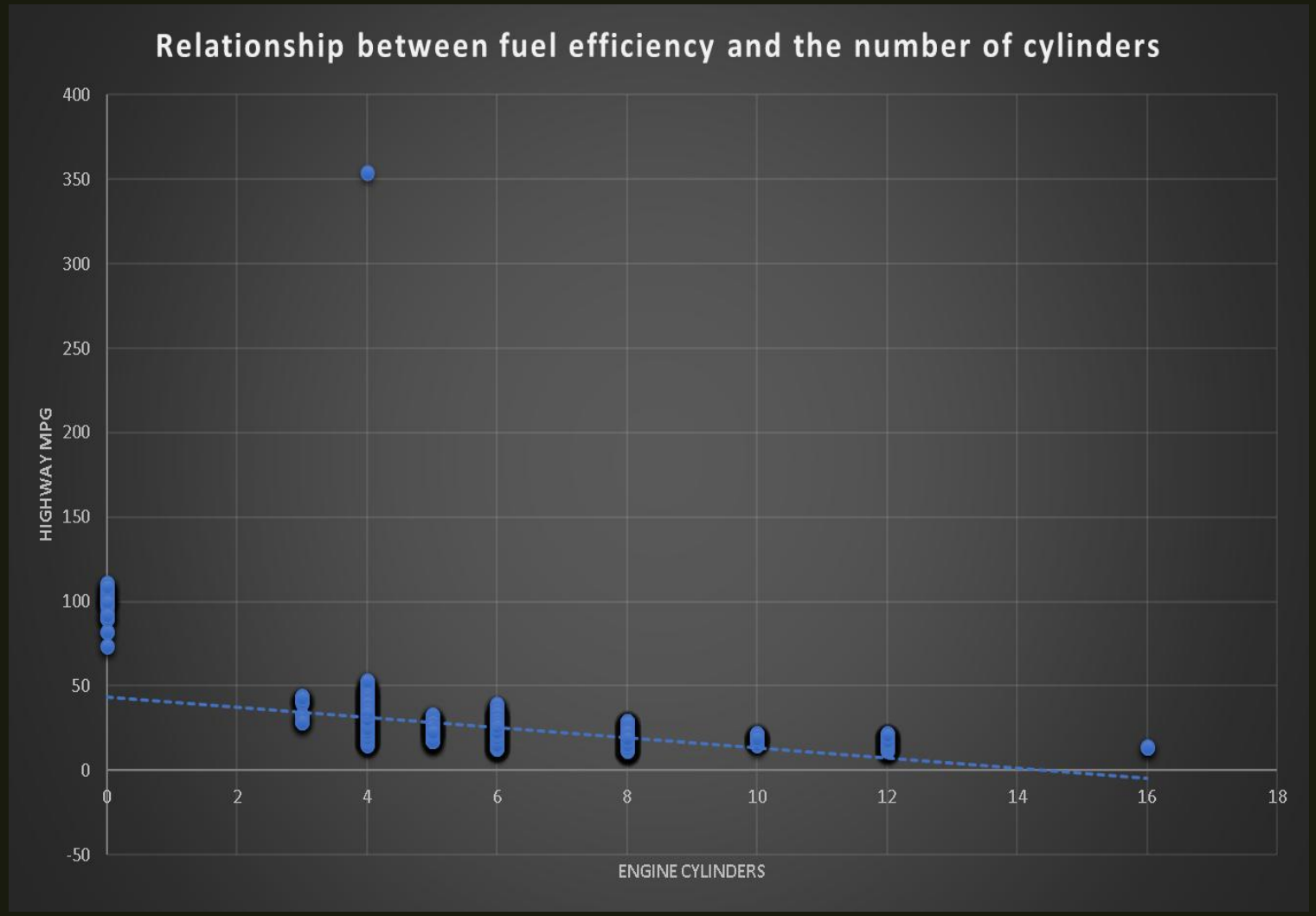
Insight : As per the Analysis, Bugatti has the Most Expensive Average Price of Cars followed by Maybach, Rolls-Royce and the Least expensive Plymouth, Suzuki



TASK 5- RELATIONSHIP BETWEEN FUEL EFFICIENCY AND ENGINE CYLINDERS

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 than the Highway MPG is Lower because More Cylinders More Powerful Engine thus Lower MPG



TASK 5- RELATIONSHIP BETWEEN FUEL EFFICIENCY AND ENGINE CYLINDERS

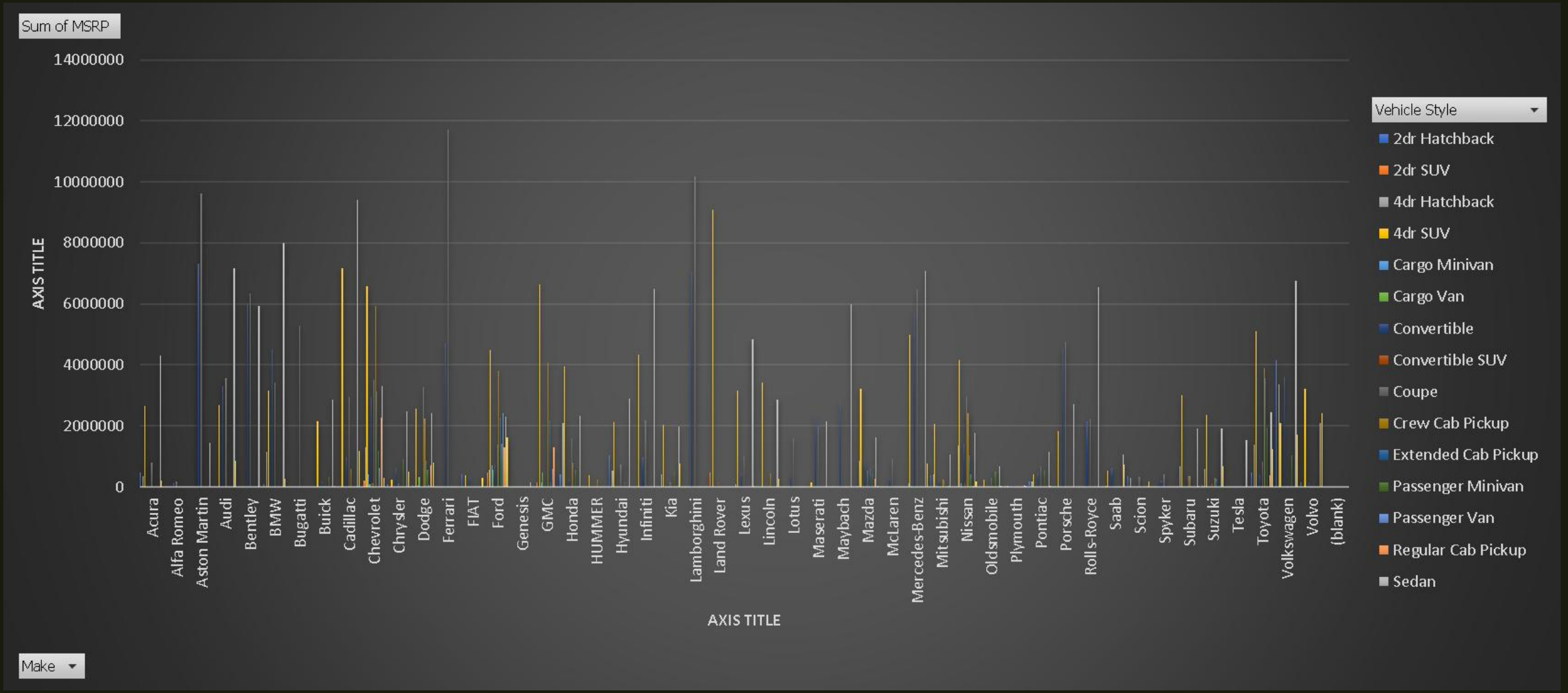
B: Calculate the correlation coefficient between the number of cylinders and highway MPG to quantify the strength and direction of the relationship.

Insight: Correlation Coefficient is {-0.621605733}

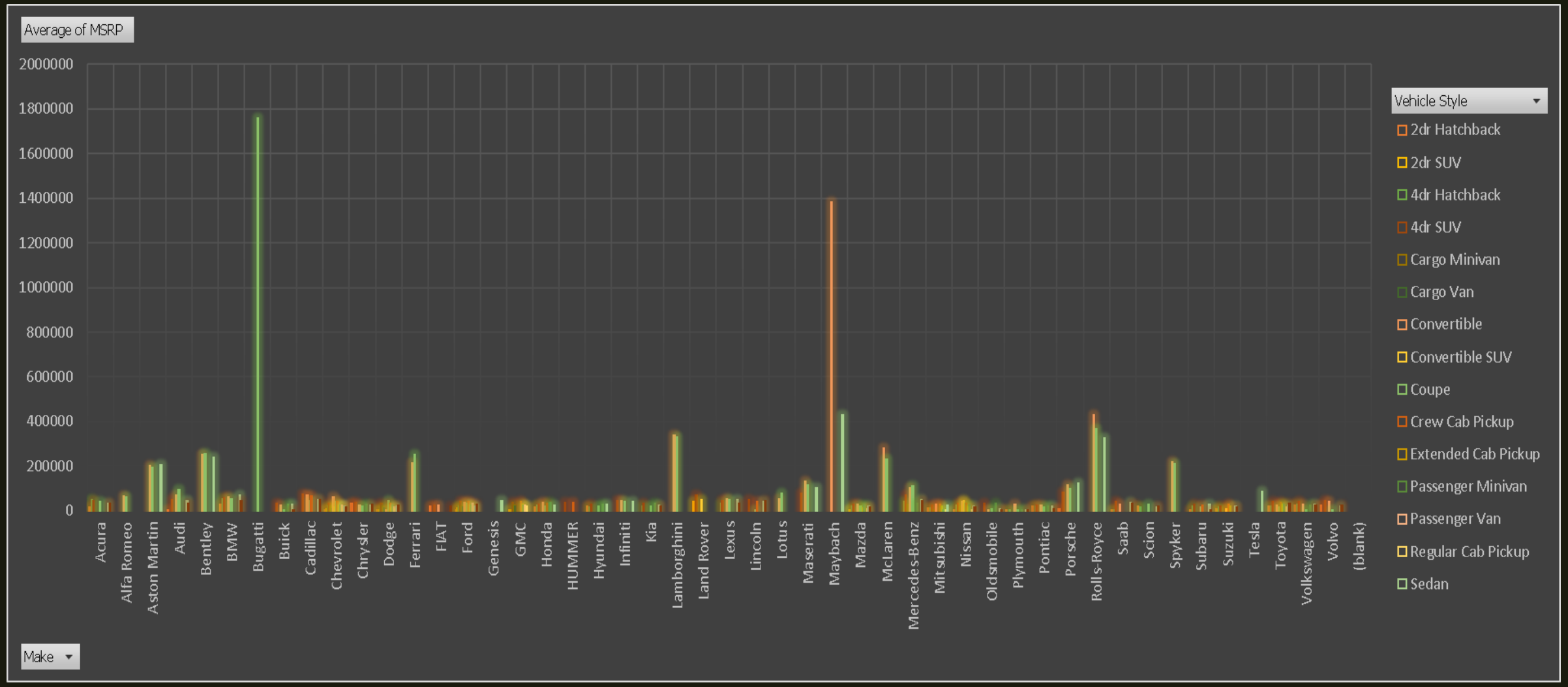
CORRELATION
-0.621605733

BUILDING THE DASHBOARD:

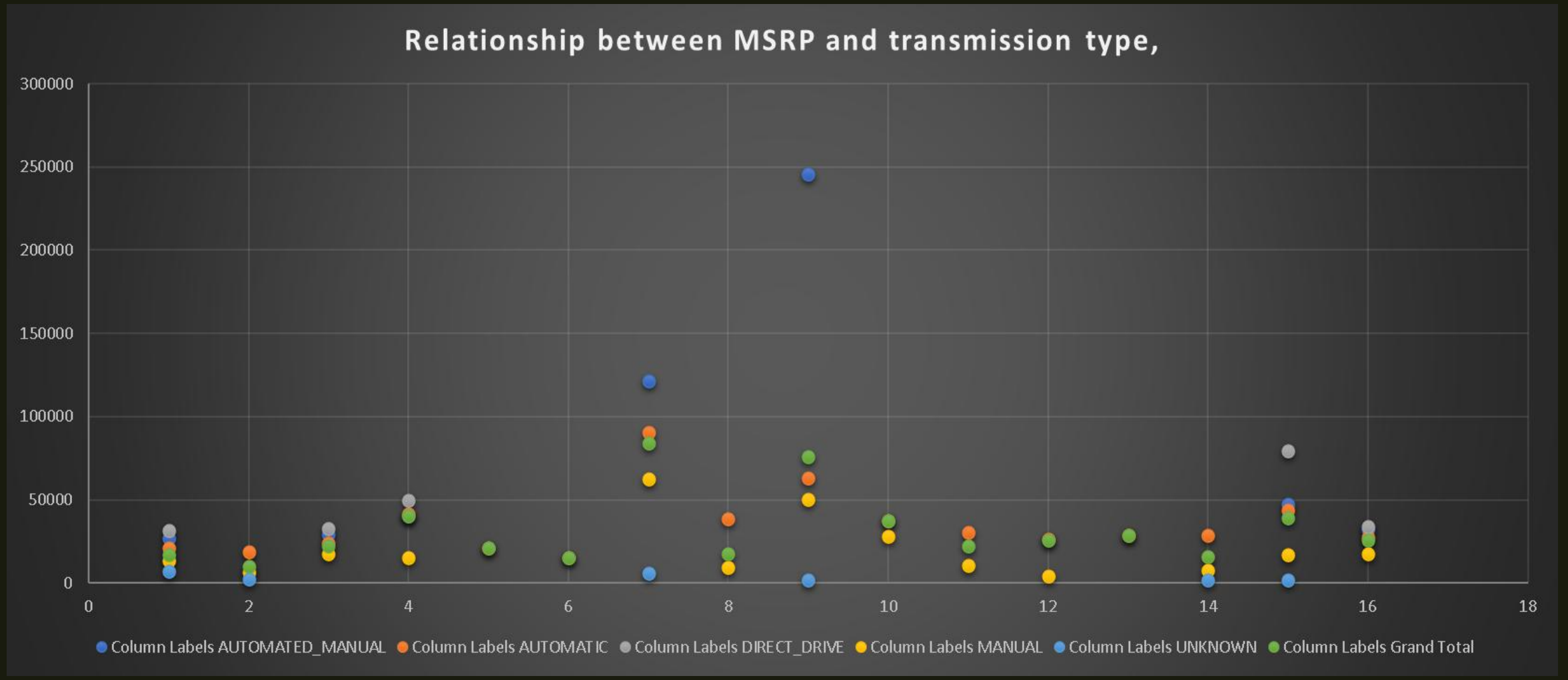
Task 1: How does the distribution of car prices vary by brand and body style?



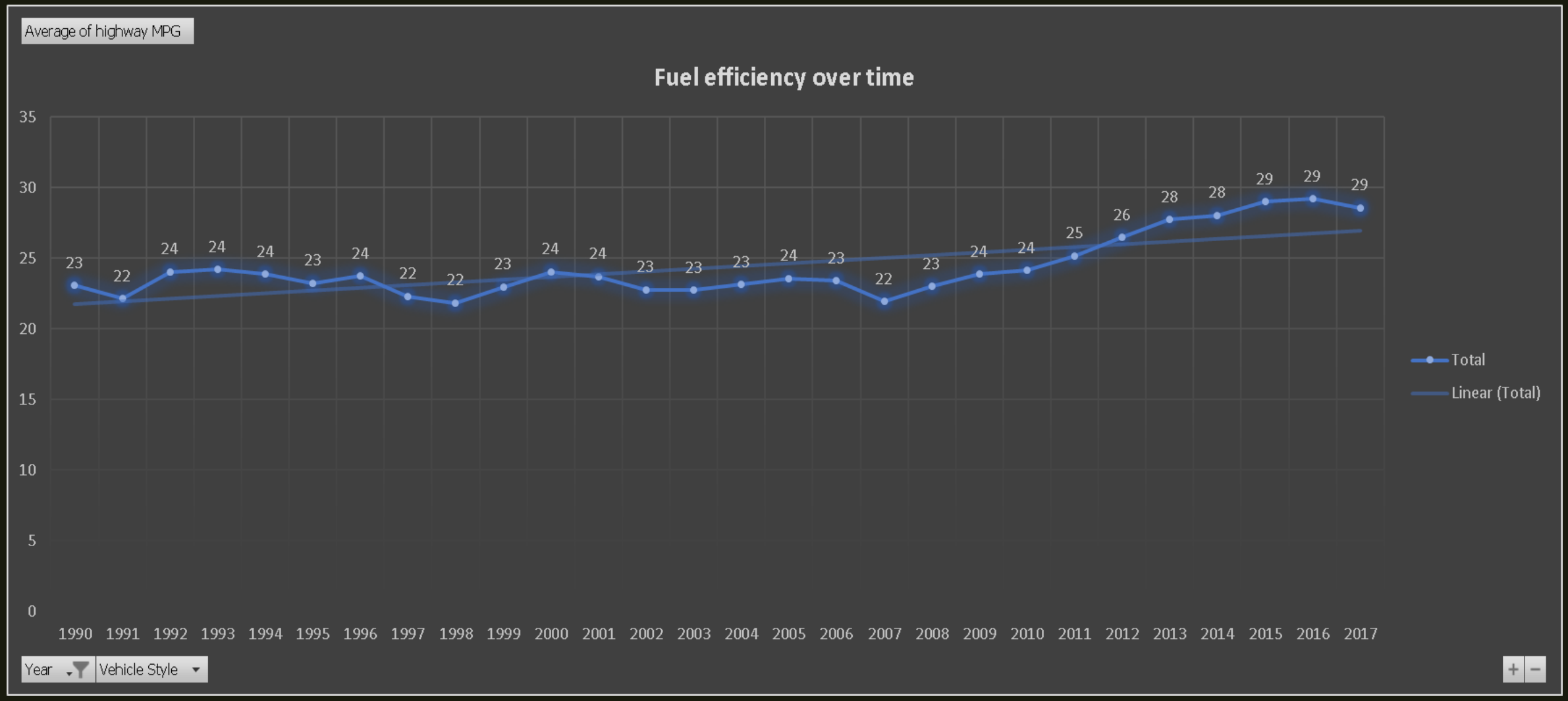
Task 2: Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?



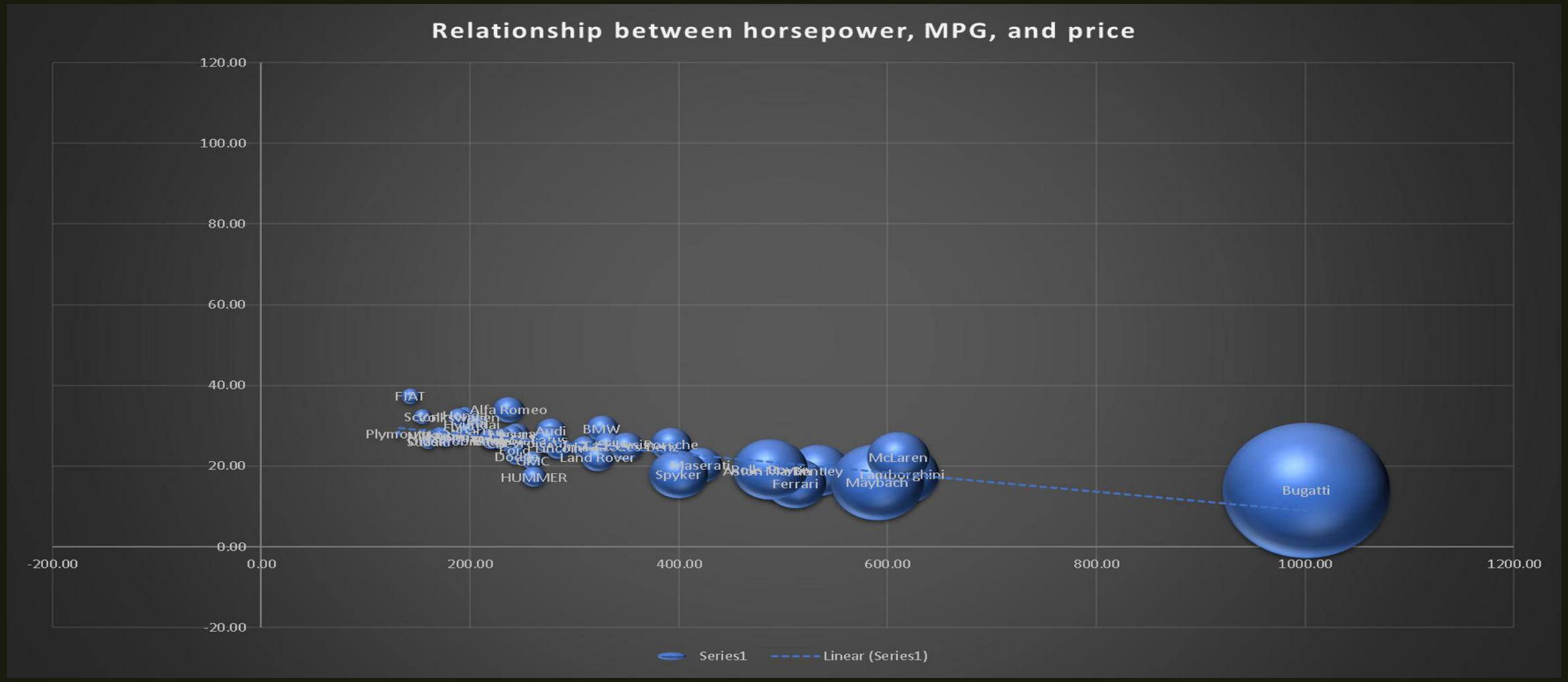
Task 3: How do the different features such as transmission type affect the MSRP, and how does this vary by body style?

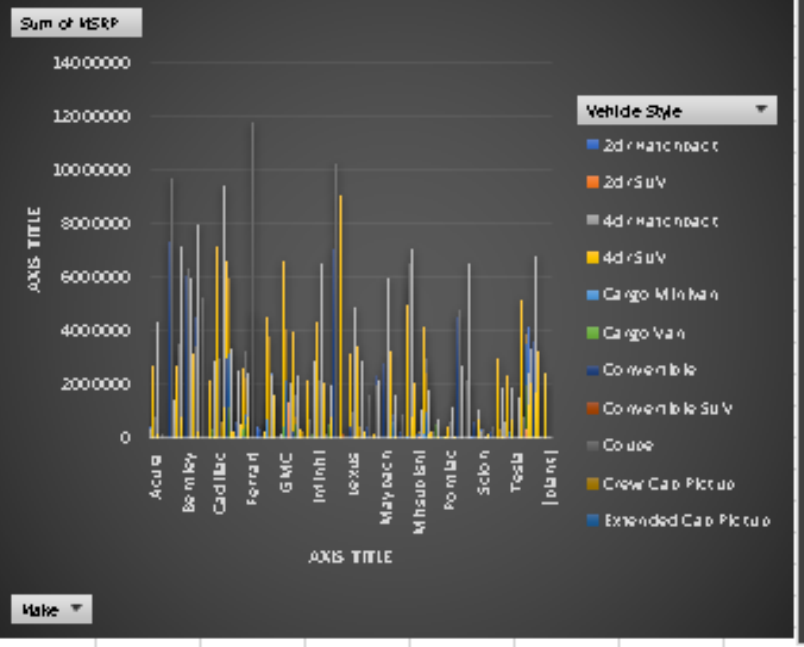


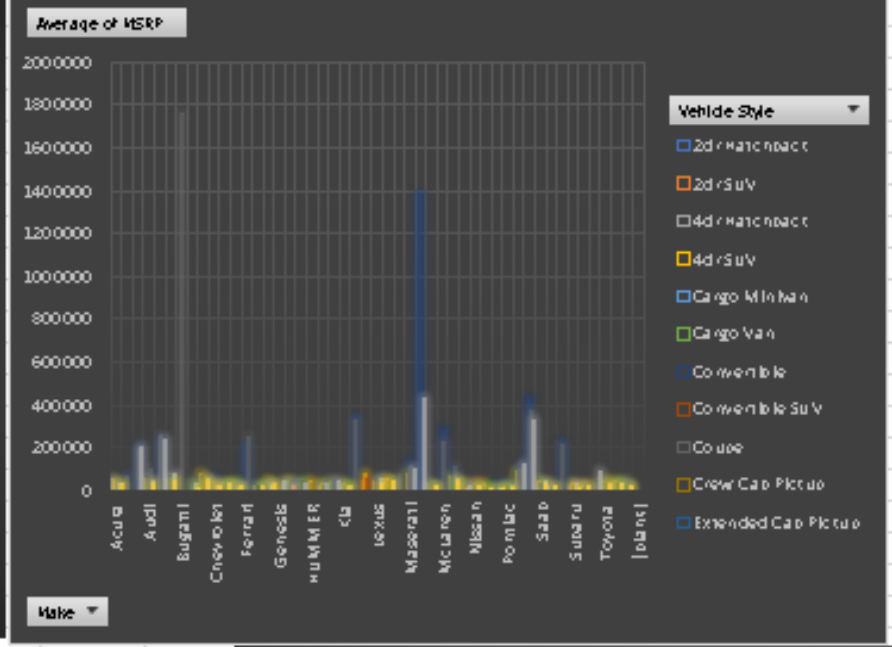
Task 4: How does the fuel efficiency of cars vary across different body styles and model years?

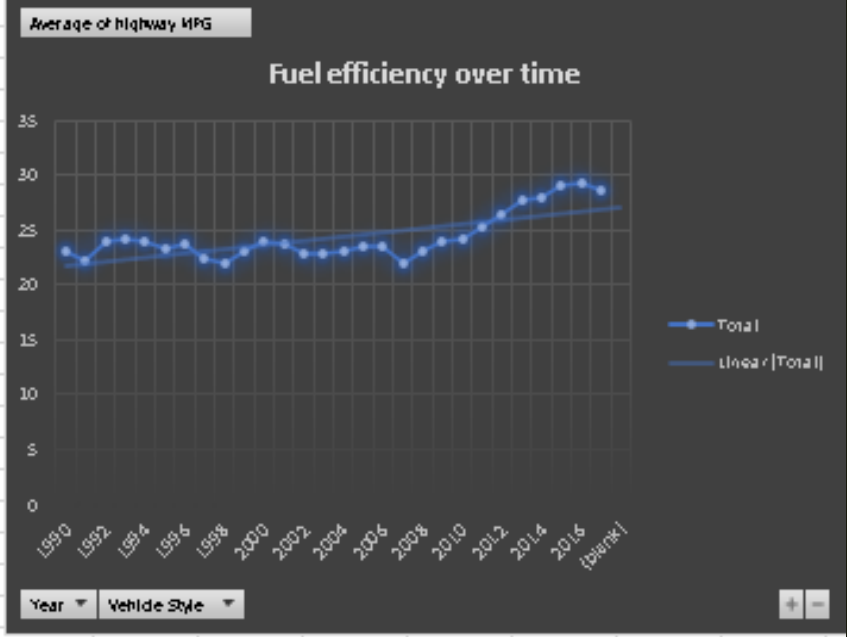


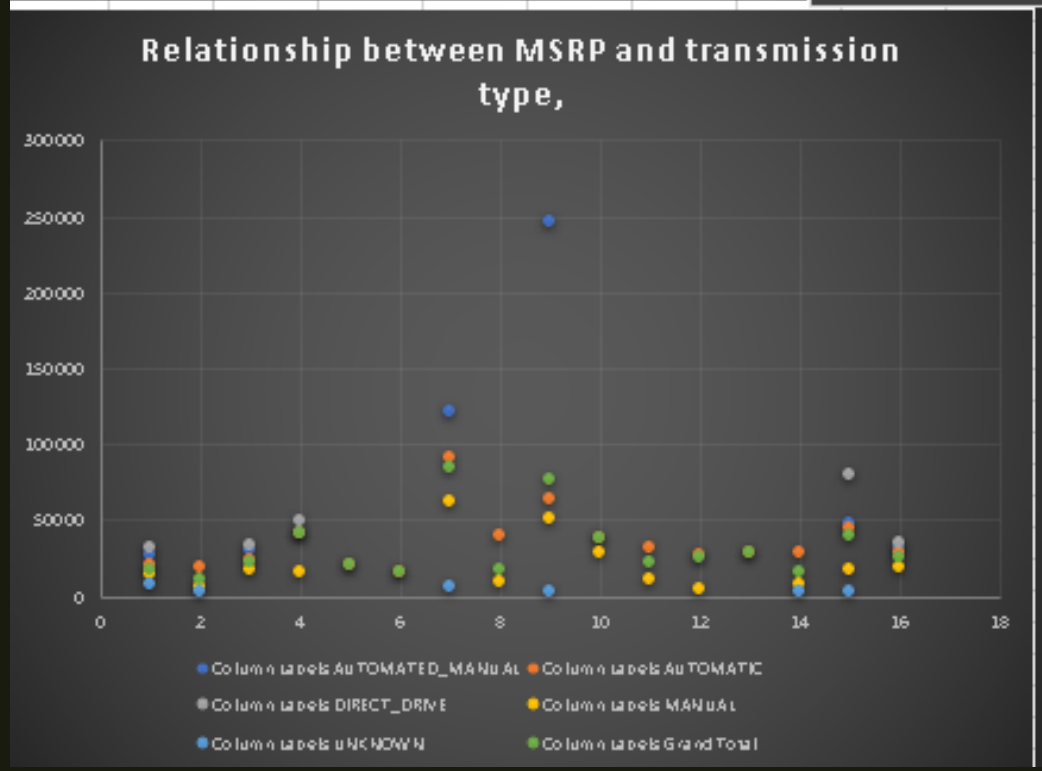
Task 5: How do the car's horsepower, MPG, and price vary across different Brands?

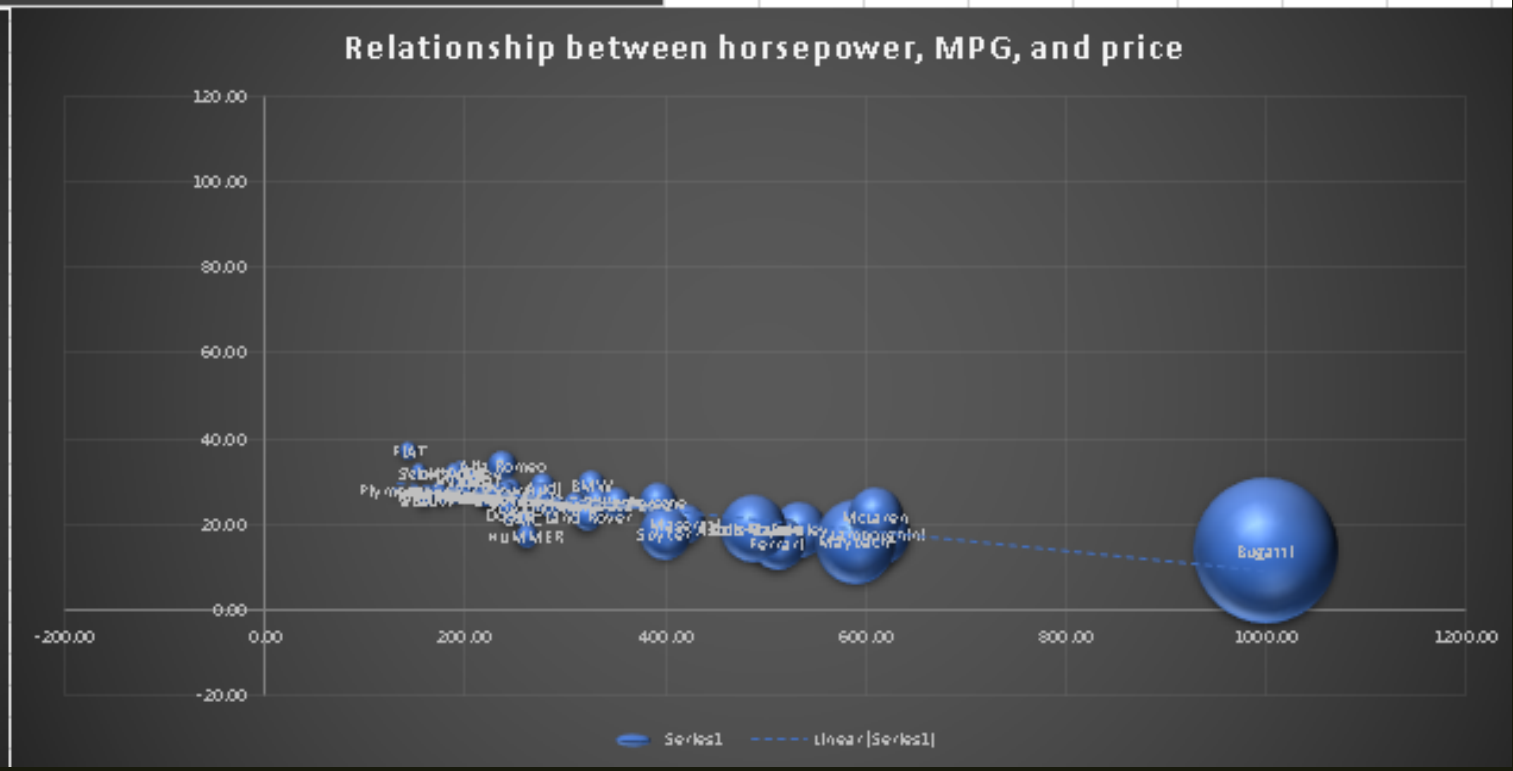



Sum of MSRP
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
AXIS TITLE
Acura
Bentley
Cadillac
Ferrari
GMC
Infiniti
Lexus
Maybach
Mitsubishi
Pontiac
Scion
Tesla
(blank)
AXIS TITLE
Vehicle Style
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pickup
Make


Average of MSRP
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Acura
Audi
Bugatti
Chevrolet
Ferrari
Genesis
HUMMER
Kia
Lexus
Maserati
Mclaren
Nissan
Pontiac
Saab
Subaru
Toyota
(blank)
Vehicle Style
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pickup
Make


Average of Highway MPG
Fuel efficiency over time
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
(blank)
Total
Linear (Total)
Year
Vehicle Style


Relationship between MSRP and transmission type,
300000
250000
200000
150000
100000
50000
0
0
2
4
6
8
10
12
14
16
18
Column Labels AUTOMATED_MANUAL
Column Labels AUTOMATIC
Column Labels DIRECT_DRIVE
Column Labels MANUAL
Column Labels UNKNOWN
Column Labels Grand Total


Relationship between horsepower, MPG, and price
120.00
100.00
80.00
60.00
40.00
20.00
0.00
-20.00
-200.00
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
FIAT
Alfa Romeo
Scion
Plymouth
Audi
BMW
Land Rover
HUMMER
Mclaren
Ferrari
Maybach
Bugatti
Series1
Linear (Series1)

RESULT

- **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 city milage, followed by number of doors. 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 USD 1,757,224, while Plymouth offers the cheapest cars with an average price of USD 3,297.
- **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.

RESULT

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

- **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.

✓ **DATASET:** https://docs.google.com/spreadsheets/d/1LEhjK717uSrxoZtQOUnbgiUdSf-Jk8h9/edit?usp=drive_link&ouid=100865564169059724511&rtpof=true&sd=true


THANK YOU!