

# PROJECT-7

Analyzing the Impact of Car Features on Price and Profitability

**FINAL PROJECT-3**

**BY : - PRADEEP SHET**

## **TECH STACK USED:-**

1.MS EXCEL

2.MS POWERPOINT

# **HYPERLINK OF EXCEL SHEET**

[https://docs.google.com/spreadsheets/d/1WN8T8QrQcTFCl\\_7u1-10-Djizak-gO8l/edit?usp=sharing&ouid=112153428545971944615&rtpof=true&sd=true](https://docs.google.com/spreadsheets/d/1WN8T8QrQcTFCl_7u1-10-Djizak-gO8l/edit?usp=sharing&ouid=112153428545971944615&rtpof=true&sd=true)

# PROJECT DESCRIPTION :

The automotive industry has been rapidly evolving over the past few decades, with a growing focus on fuel efficiency, environmental sustainability, and technological innovation. With increasing competition among manufacturers and a changing consumer landscape, it has become more important than ever to understand the factors that drive consumer demand for cars. In recent years, there has been a growing trend towards electric and hybrid vehicles and increased interest in alternative fuel sources such as hydrogen and natural gas. At the same time, traditional gasoline-powered cars remain dominant in the market, with varying fuel types and grades available to consumers. For the given dataset, as a Data Analyst, the client has asked How can a car manufacturer optimize pricing and product development decisions to maximize profitability while meeting consumer demand? This problem could be approached by analyzing the relationship between a car's features, market category, and pricing, and identifying which features and categories are most popular among consumers and most profitable for the manufacturer.

# DATASET DESCRIPTION:

The dataset contains information on various car models and their specifications, and is titled "Car Features and MSRP". It was collected and made available on Kaggle by Cooper Union, a private college located in New York City.

Here is a brief overview of the dataset:

- **Number of observations:** 11,299.
- **Number of variables:** 16
- **File type:** CSV (Comma Separated Values) The variables in the dataset are:
  - **Make:** the make or brand of the car
  - **Model:** the specific model of the car
  - **Year:** the year the car was released

- **Engine Fuel Type**: the type of fuel used by the car (gasoline, diesel, etc.)
- **Engine HP**: the horsepower of the car's engine
- **Engine Cylinders**: the number of cylinders in the car's engine
- **Transmission Type**: the type of transmission (automatic or manual)
- **Driven\_Wheels**: the type of wheels driven by the car (front, rear, all)
- **Number of Doors**: the number of doors the car has
- **Market Category**: the market category the car belongs to (Luxury, Performance, etc.)
- **Vehicle Size**: the size of the car
- **Vehicle Style**: the style of the car (Sedan, Coupe, etc.)
- **Highway MPG**: the estimated miles per gallon the car gets on the highway
- **City MPG**: the estimated miles per gallon the car gets in the city
- **Popularity**: a ranking of the popularity of the car (based on the number of times it has been viewed on
- **MSRP**: the manufacturer's suggested retail price of the car

# BUSINESS AND DATA ANALYTICS SKILLS:

- The given tasks below based on the business problem would require advanced Excel skills and knowledge of data analysis techniques such as regression analysis, pivot tables, sensitivity analysis, optimization, and time series analysis. However, by answering these questions and building an interactive dashboard, a data analyst could provide valuable insights to a car manufacturer and help them optimize their pricing and product development decisions to maximize profitability while meeting consumer demand.

# FILLING NULL VALUES

- NO OF DOORS HAS SOME BLANK VALUES WHEN APPLIED FILTER ON THAT COLUMN.
- “ =COUNTBLANK(I2:I11200) ”— 6 BLANK VALUES WERE FOUND.
- SINCE IT WAS NUMBER OF DOORS I FILLED THE MISSING VALUES WITH MODE.
- “ =MODE(I2:I11200) ”—4.
- REPLACED NULL VALUES WITH 4.

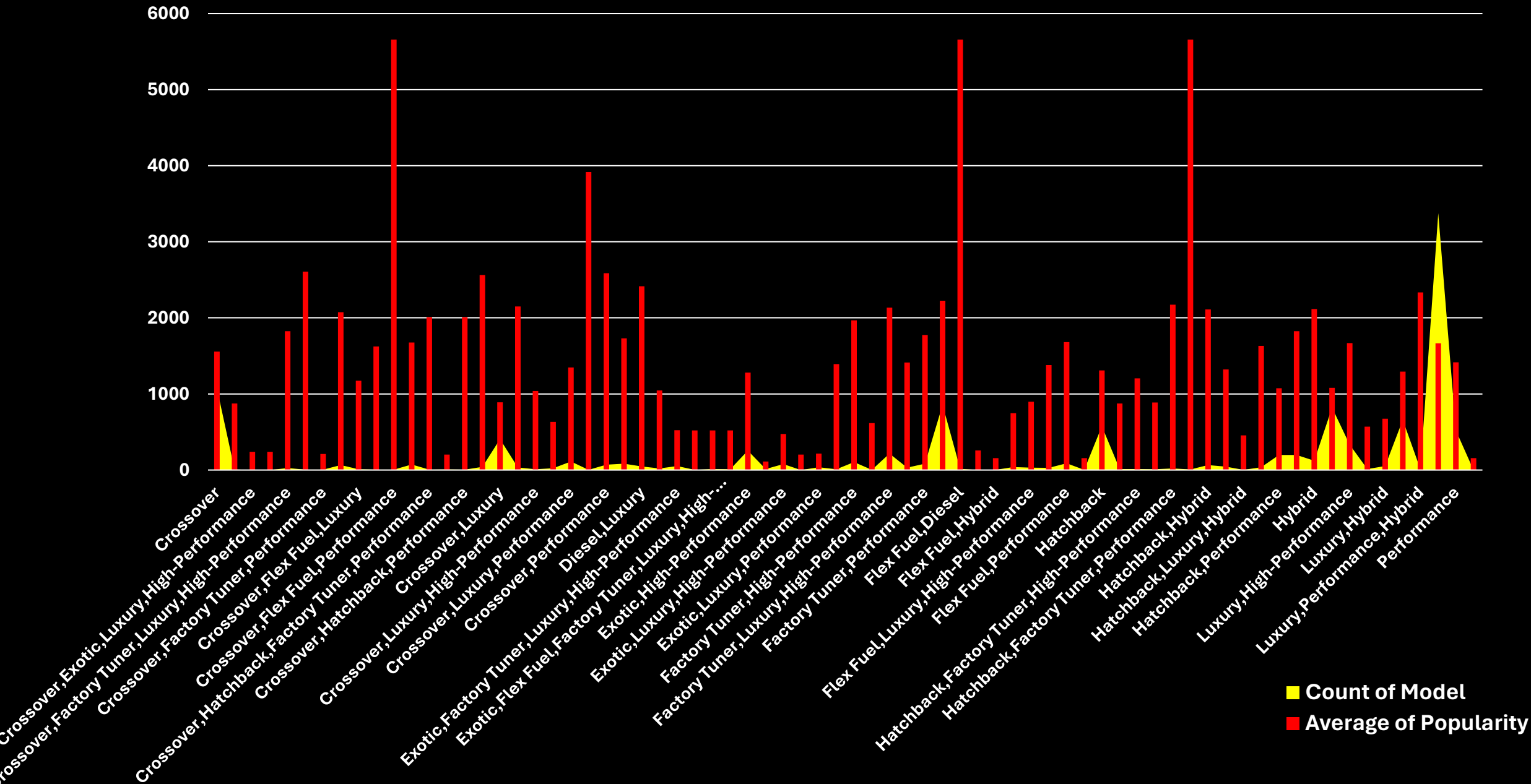


**A.**

**Insight Required:** How does the popularity of a car model vary across different market categories?

- **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.

Row Labels	Count of Model	Average of Popularity
Crossover	1075	1556.168372
Crossover,Diesel	7	873
Crossover,Exotic,Luxury,High-Performance	1	238
Crossover,Exotic,Luxury,Performance	1	238
Crossover,Factory Tuner,Luxury,High-Performance	26	1823.461538
Crossover,Factory Tuner,Luxury,Performance	5	2607.4
Crossover,Factory Tuner,Performance	4	210
Crossover,Flex Fuel	64	2073.75
Crossover,Flex Fuel,Luxury	10	1173.2
Crossover,Flex Fuel,Luxury,Performance	6	1624
Crossover,Flex Fuel,Performance	6	5657
Crossover,Hatchback	72	1675.694444
Crossover,Hatchback,Factory Tuner,Performance	6	2009
Crossover,Hatchback,Luxury	7	204
Crossover,Hatchback,Performance	6	2009
Crossover,Hybrid	42	2563.380952
Crossover,Luxury	406	889.2142857
Crossover,Luxury,Diesel	34	2149.411765
Crossover,Luxury,High-Performance	9	1037.222222
Crossover,Luxury,Hybrid	24	630.9166667
Crossover,Luxury,Performance	112	1349.089286
Crossover,Luxury,Performance,Hybrid	2	3916
Crossover,Performance	69	2585.956522
Diesel	84	1730.904762
Diesel,Luxury	47	2416.106383
Exotic,Factory Tuner,High-Performance	21	1046.380952
Exotic,Factory Tuner,Luxury,High-Performance	51	523.0196078
Exotic,Factory Tuner,Luxury,Performance	3	520
Exotic,Flex Fuel,Factory Tuner,Luxury,High-Performance	13	520
Exotic,Flex Fuel,Luxury,High-Performance	11	520

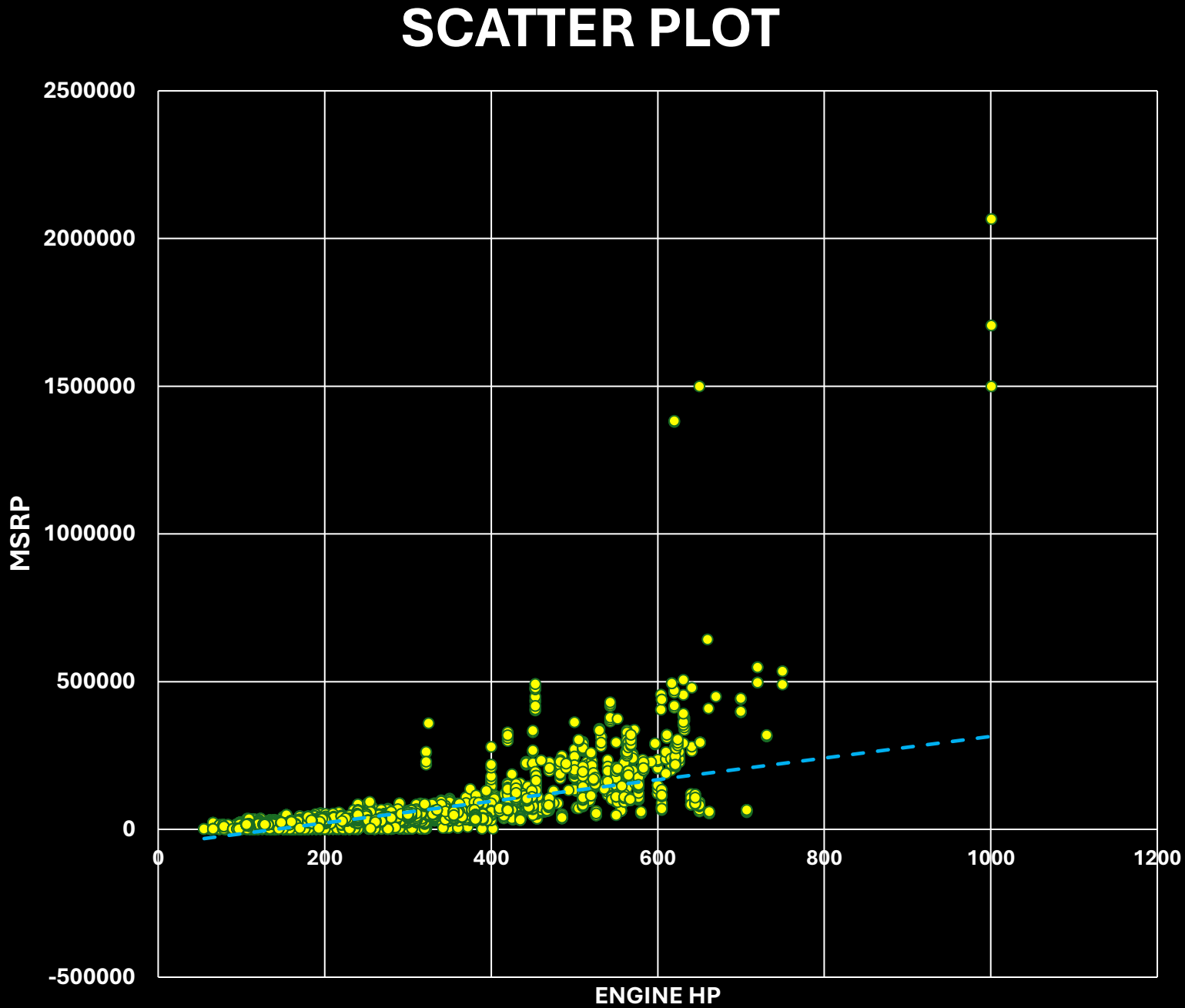


**B.**

**Insight Required:** What is the 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.

Engine HP	MSRP
335	46135
300	40650
300	36350
230	29450
230	34500
230	31200
300	44100
300	39300
230	36900
230	37200
300	39600
230	31500
300	44400
230	37200
320	48250
320	43550
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
172	2000
160	27495
160	24995



C.

**Insight Required:** Which car features are most important in determining a car's price?

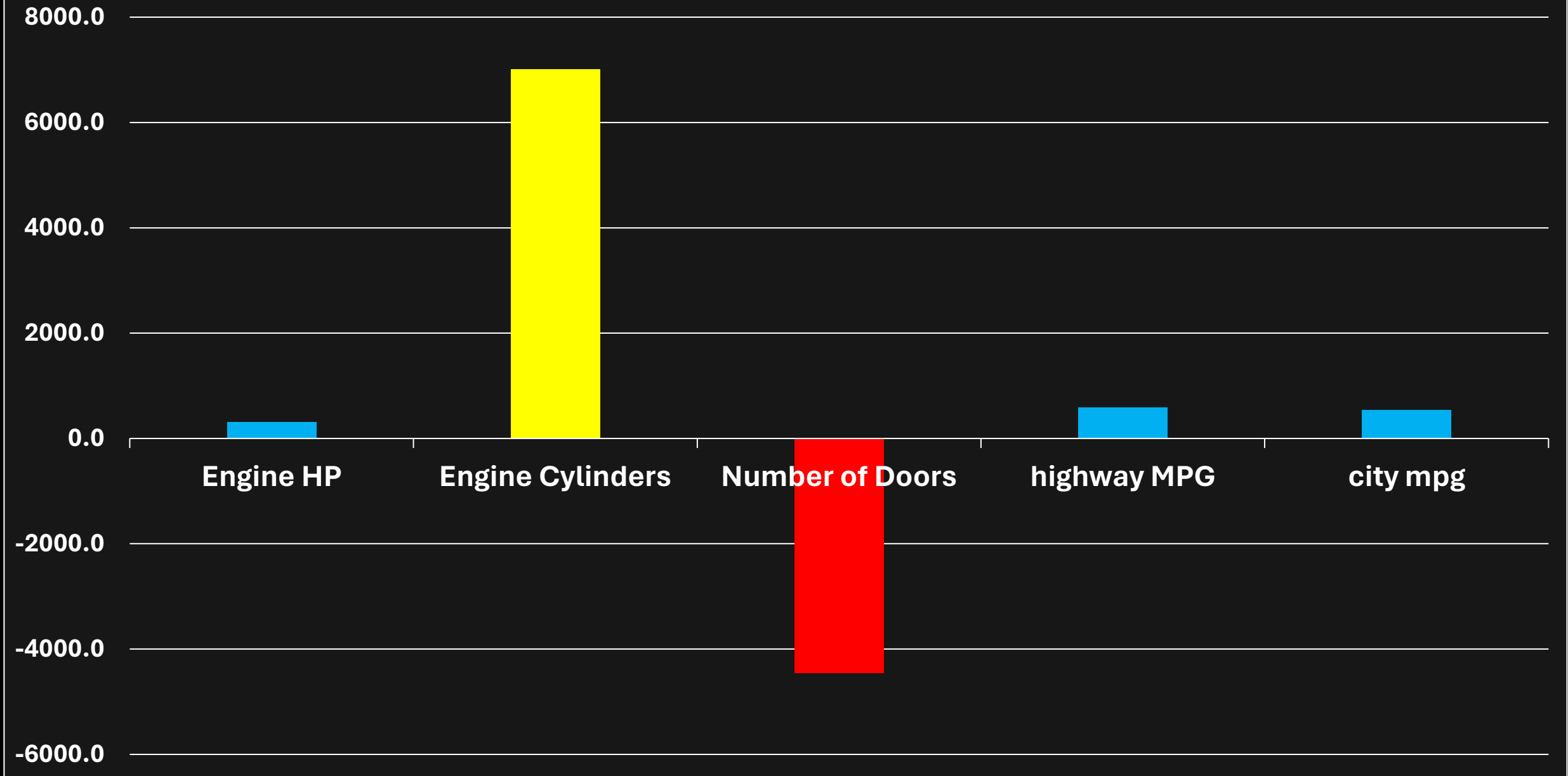
● **Task 3:** Use regression analysis to identify the variables that have the strongest relationship with a car's price. Then create a bar chart that shows the coefficient values for each variable to visualize their relative importance.

Regression Statistics	
Multiple R	0.673518908
R Square	0.453627719
Adjusted R Square	0.453383651
Standard Error	45495.01904
Observations	11199

ANOVA					
	df	SS	MS	F	Significance F
Regression	5	1.92347E+13	3.84694E+12	1858.60639	0
Residual	11193	2.31672E+13	2069796757		
Total	11198	4.24019E+13			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-86083.4	3570.5	-24.1	0.0	-93082.2	-79084.7	-93082.2	-79084.7
Engine HP	305.8	6.1	50.1	0.0	293.8	317.8	293.8	317.8
Engine Cylinders	7005.6	441.9	15.9	0.0	6139.4	7871.7	6139.4	7871.7
Number of Doors	-4451.0	498.9	-8.9	0.0	-5429.0	-3473.1	-5429.0	-3473.1
highway MPG	587.0	107.6	5.5	0.0	376.2	797.8	376.2	797.8
city mpg	540.2	101.9	5.3	0.0	340.3	740.0	340.3	740.0

# COEFFICIENTS OF VARIABLES





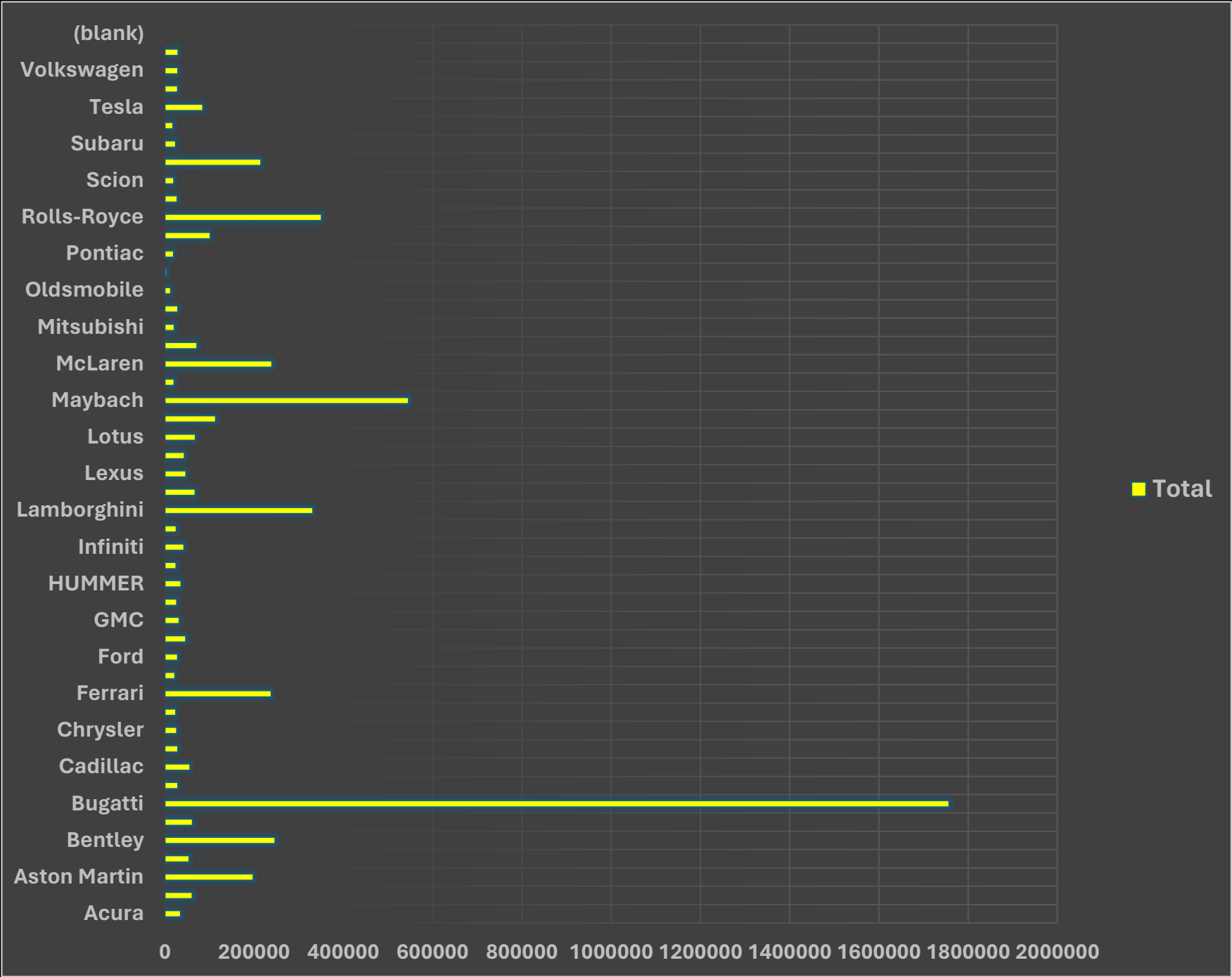
**D.**

**Insight Required:** How does the average price of a car vary across different manufacturers?

● **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.

Row Labels	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	29074.72576
Chrysler	26722.96257
Dodge	24857.04537
Ferrari	238218.8406
FIAT	22670.24194
Ford	28511.30788
Genesis	46616.66667
GMC	32444.08506
Honda	26655.14781
HUMMER	36464.41176
Hyundai	24926.26255
Infiniti	42640.27134
Kia	25513.75546
Lamborghini	331567.3077
Land Rover	68067.08633
Lexus	47549.06931
Lincoln	43860.825
Lotus	68377.14286
Maserati	113684.4909
Maybach	546221.875



**E.**

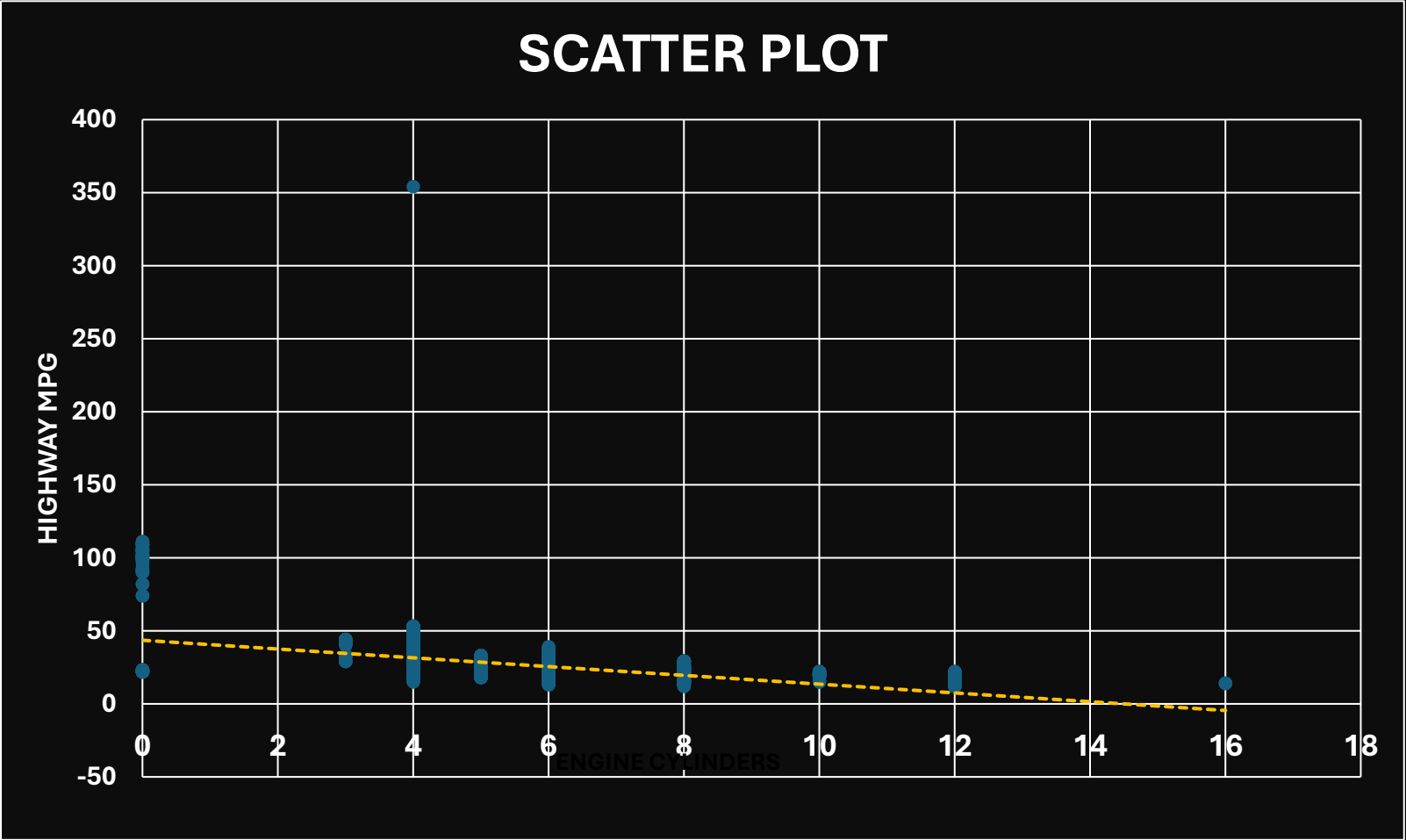
**Insight Required:** What is the relationship between fuel efficiency and the number of cylinders in a car's engine?

● **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.

Engine Cylinders	highway MPG
6	26
6	28
6	28
6	28
6	28
6	28
6	26
6	28
6	28
6	27
6	28
6	28
6	28
6	28
6	25
6	28
6	24
6	20
6	21
6	24
6	20
6	21
6	21
6	22
6	22
6	22
6	22
6	21
4	35
4	35

	Engine Cylinders	highway MPG
Engine Cylinders	1	-0.6103
highway MPG	-0.61034	1



# INSIGHTS

- **A.** CROSSOVER IS THE HIGHEST SELLING CAR AND FLEX FUEL, DIESEL HIGH POPULARITY.
- **B.** ENGINE POWER AND MSRP HAS A POSITIVE LINEAR RELATION.
- **C.** ENGINE CYLINDER HAS A HIGH POSITIVE COEFFICIENT IN DETERMINING MSRP ALONG WITH HIGHWAY MPG.
- **D.** SPORTS CAR LIKE BUGATI, MAYBACH ARE MOST EXPENSIVE AND EVERYDAY/DAILY CARS ARE LESS IN COST.
- **E.** ENGINE CYLINDER AND HIGHWAY MPG ARE -VLY CORRELATED, SO AS ENGINE CYLINDERS INCREASES EFFICIENCY DECREASES.

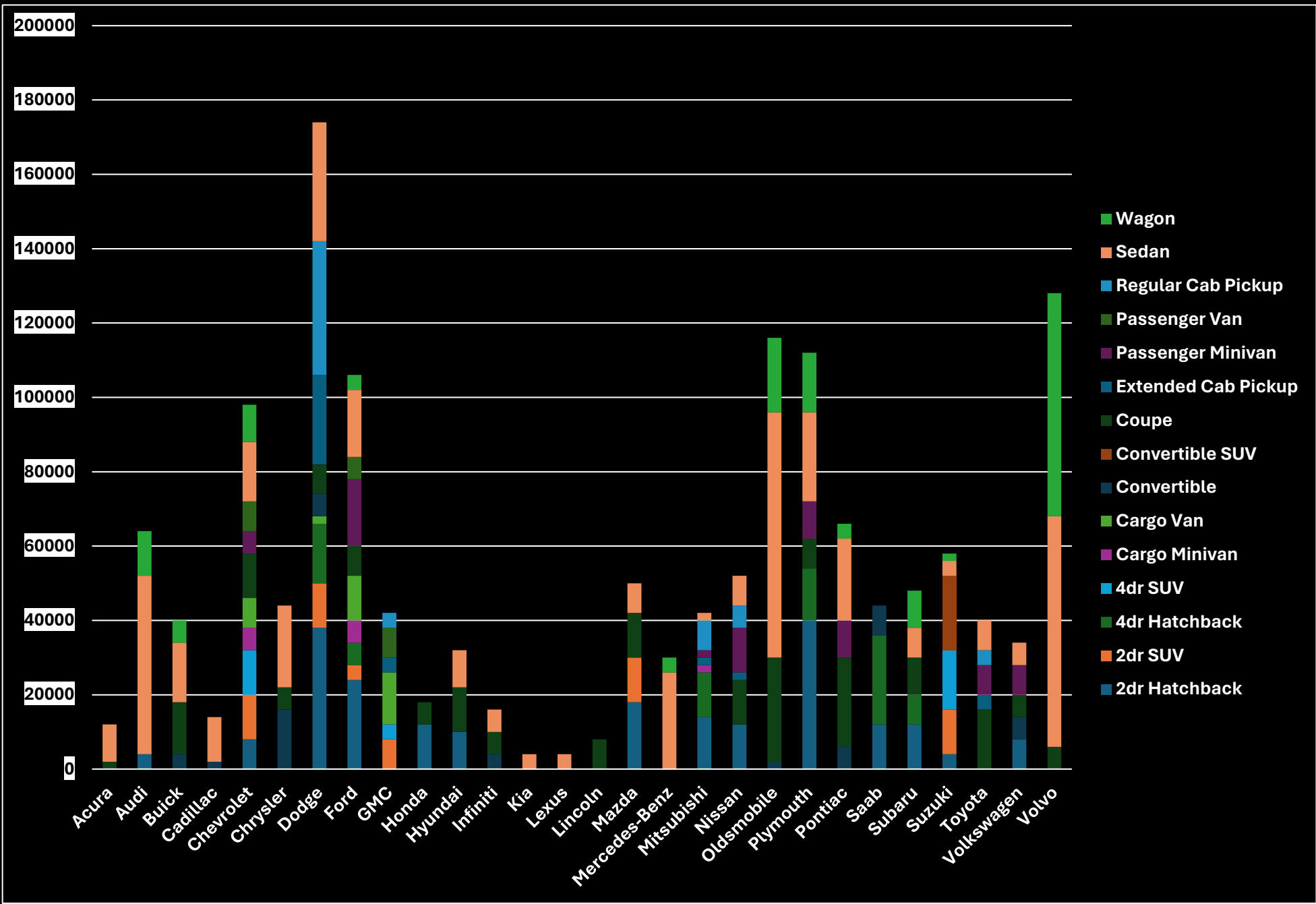
# BUILDING THE DASHBOARD:

- Now for the Next portion of the Project, you need to create the Interactive Dashboard. Use filters and slicers to make the chart interactive. The client has requested these questions given below:

**A.**

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

● **Hints:** Stacked column chart to show the distribution of car prices by brand and body style. Use filters and slicers to make the chart interactive. Calculate the total MSRP for each brand and body style using SUMIF or Pivot Tables.



MSRP

2000

2002

2003

2008

2012

2013

2019

Model

80

90

100

200

240

323

626

740

Make

Acura

Audi

Buick

Cadillac

Chevrolet

Chrysler

Dodge

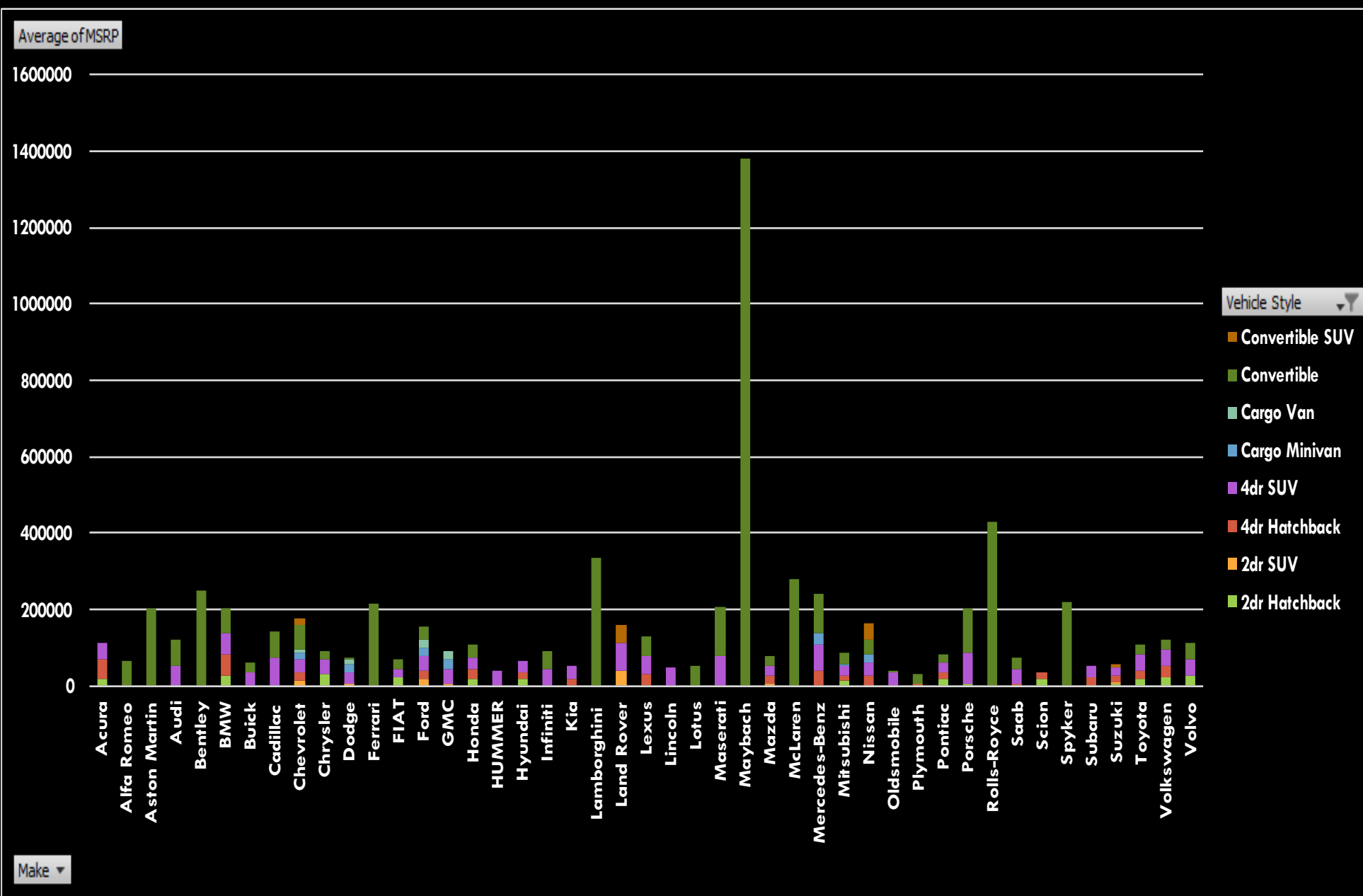
Ford



**B.**

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

● **Hints:** Clustered column chart to compare the average MSRPs across different car brands and body styles. Calculate the average MSRP for each brand and body style using AVERAGEIF or Pivot Tables.



Make

- Acura
- Alfa Romeo
- Aston Martin
- Audi
- Bentley
- BMW
- Buick
- Cadillac

Vehicle Style

- 2dr Hatchback
- 2dr SUV
- 4dr Hatchback
- 4dr SUV
- Cargo Minivan
- Cargo Van
- Convertible
- Convertible SUV

MSRP

- 2041
- 2050
- 2052
- 2063
- 2078
- 2079
- 2080
- 2084

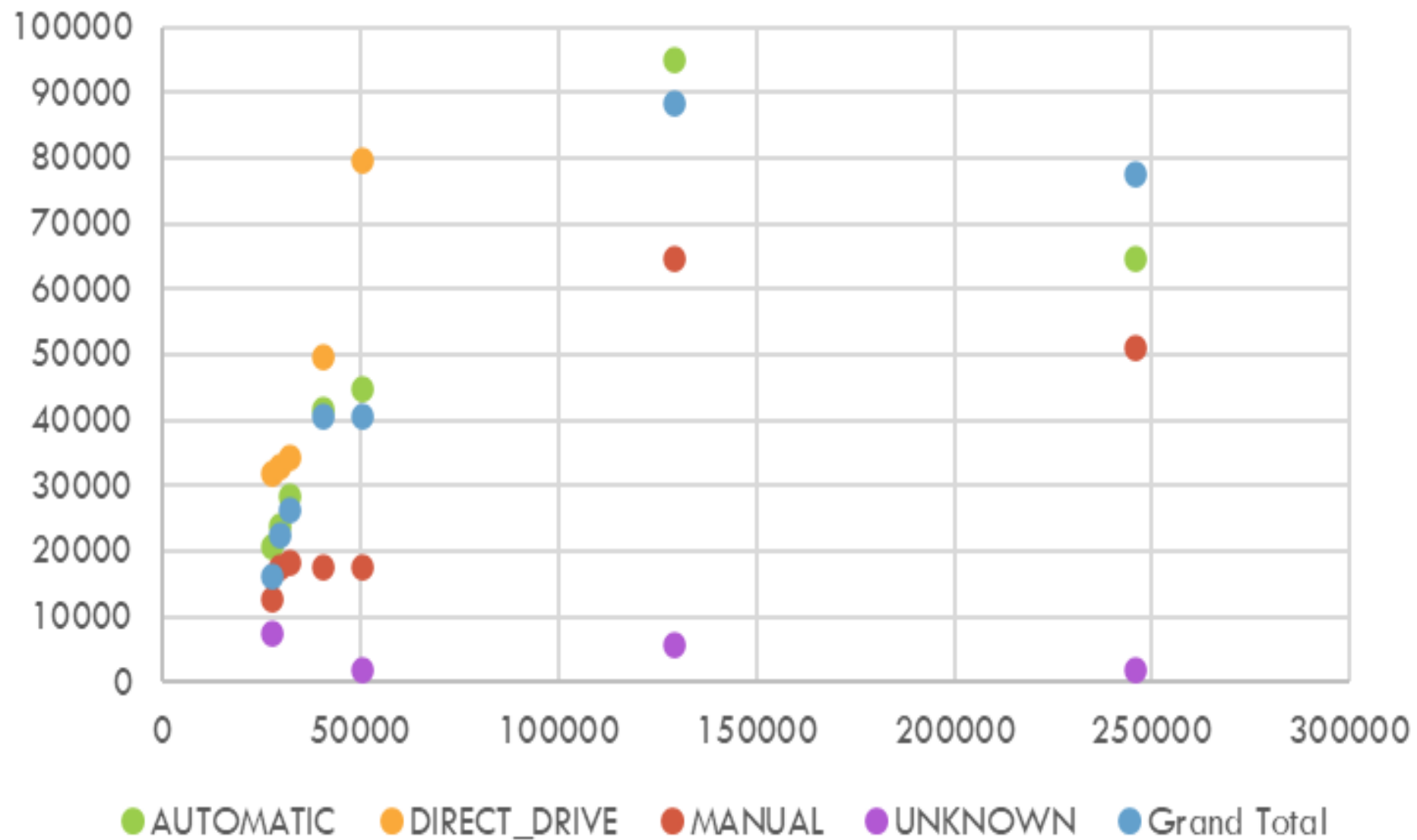
C.

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

● **Hints**: Scatter plot chart to visualize the relationship between MSRP and transmission type, with different symbols for each body style. Calculate the average MSRP for each combination of transmission type and body style using AVERAGEIFS or Pivot Tables.

Average of MSRP	Column Labels					
Row Labels	AUTOMATED_MANUAL	AUTOMATIC	DIRECT_DRIVE	MANUAL	UNKNOWN	Grand Total
2dr Hatchback	27470.41667	20784.09901	31800	12840.65556	7361.5	16177.74
2dr SUV		24153.60606		9173.018519	2371	14306.549
4dr Hatchback	29347.04545	23888.73529	32799.72973	17500.36364		22416.468
4dr SUV	40451.15385	41638.26534	49800	17422.08791		40730.274
Cargo Minivan		20315.59322				20315.593
Cargo Van		17019.29762				17019.298
Convertible	129082.2339	95153.3131		64794.34437	5783.5	88216.792
Convertible SUV		38925.5		9594.8		17975
Coupe	245977.4252	64523.41955		50901.4973	2000	77595.288
Crew Cab Pickup		37718.95307		28233.10811		37183.111
Extended Cab Pickup		30711.45251		11553.29707		23041.772
Passenger Minivan		26589.50919		6510		26176.563
Passenger Van		30578.06612				30578.066
Regular Cab Pickup		28536.8239		8759.454054	2000	17854.649
Sedan	50385.39326	44671.35638	79512.25	17557.26441	2000	40462.02
Wagon	31985.27778	28219.45742	34250	18398.57813		26156.94
Grand Total	108718.9873	41816.12431	47351.25	28267.91989	3647.833333	41925.927

# Chart Title



MSRP

2000

2002

2003

2008

2012

2013

Vehicle Style

2dr Hatchback

2dr SUV

4dr Hatchback

4dr SUV

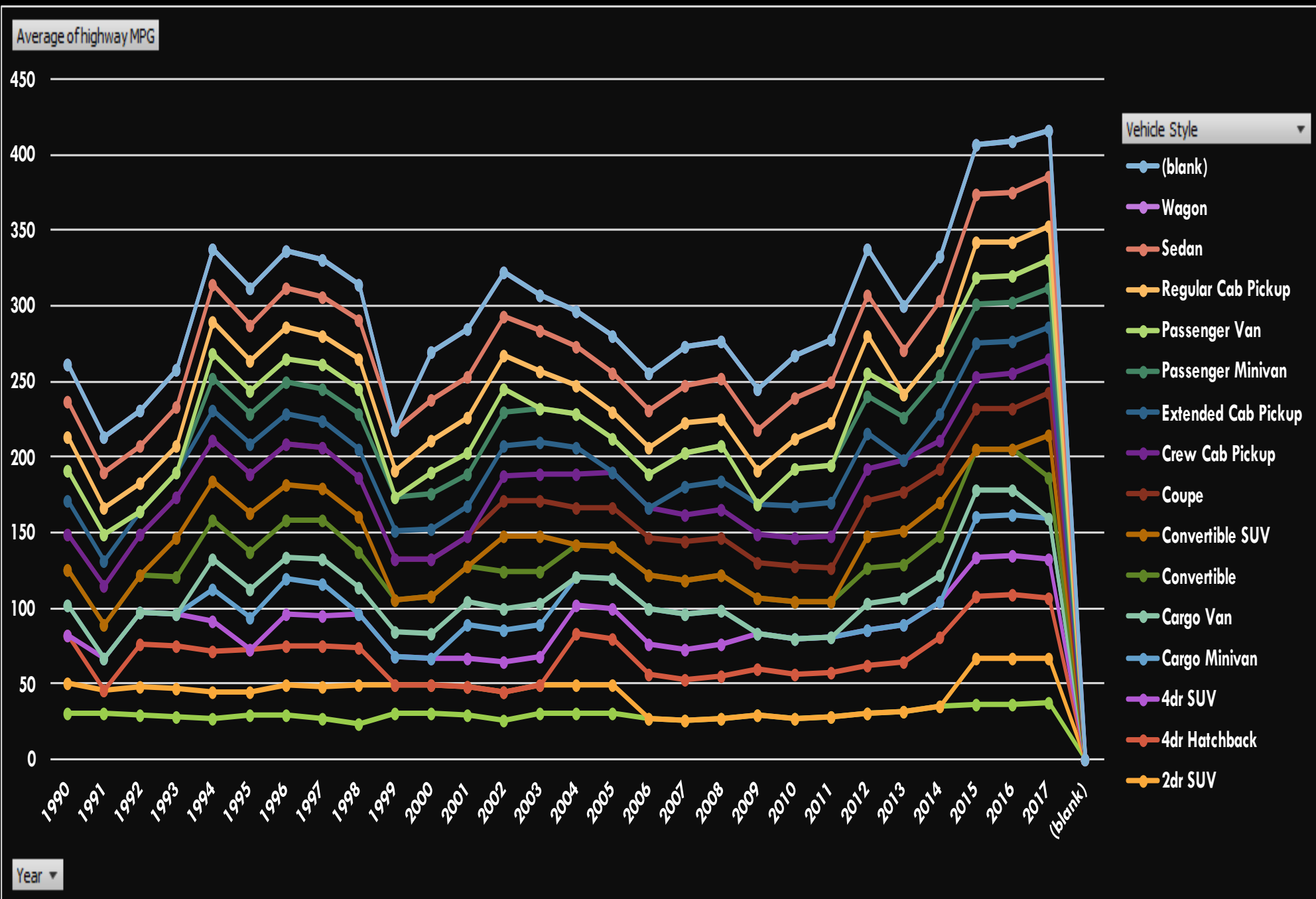
Cargo Minivan

Cargo Van

**D.**

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

● **Hints:** Line chart to show the trend of fuel efficiency (MPG) over time for each body style. Calculate the average MPG for each combination of body style and model year using AVERAGEIFS or Pivot Tables.



Year

1990

1991

1992

1993

1994

1995

1996

1997

highway MPG

12

13

14

15

16

17

18

19

Vehicle Style

2dr Hatchback

2dr SUV

4dr Hatchback

4dr SUV

Cargo Minivan

Cargo Van

Convertible

Convertible S...

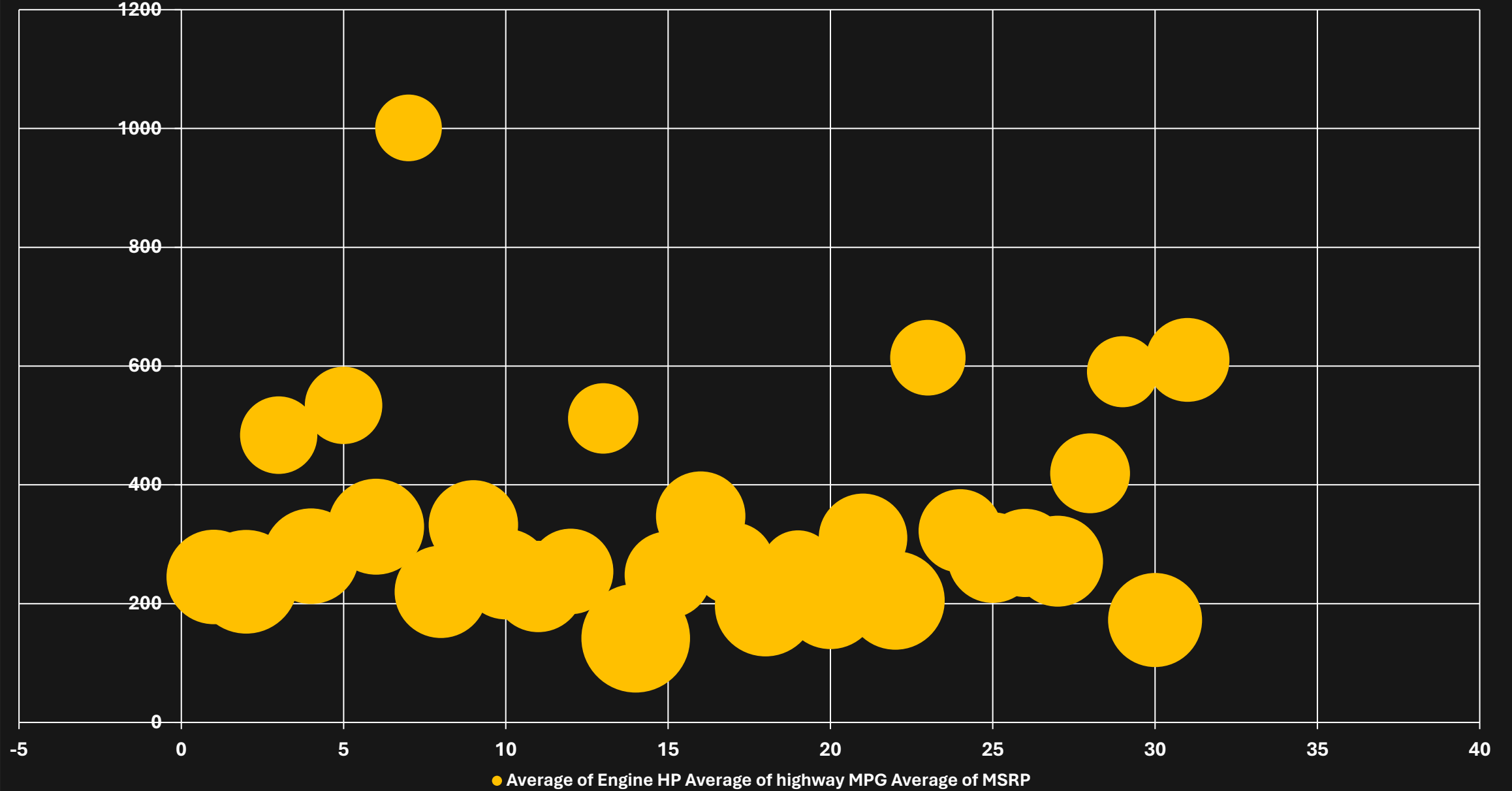
**E.**

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

● **Hints:** Bubble chart to visualize the relationship between horsepower, MPG, and price across different car brands. Assign different colors to each brand and label the bubbles with the car model name. Calculate the average horsepower, MPG, and MSRP for each car brand using AVERAGEIFS or Pivot Tables.

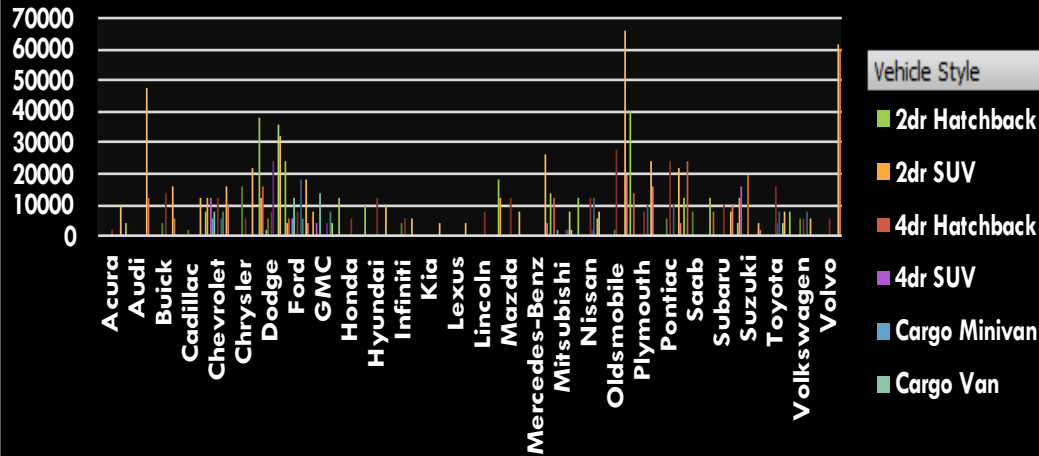


Average of Engine HP Average of highway MPG Average of MSRP



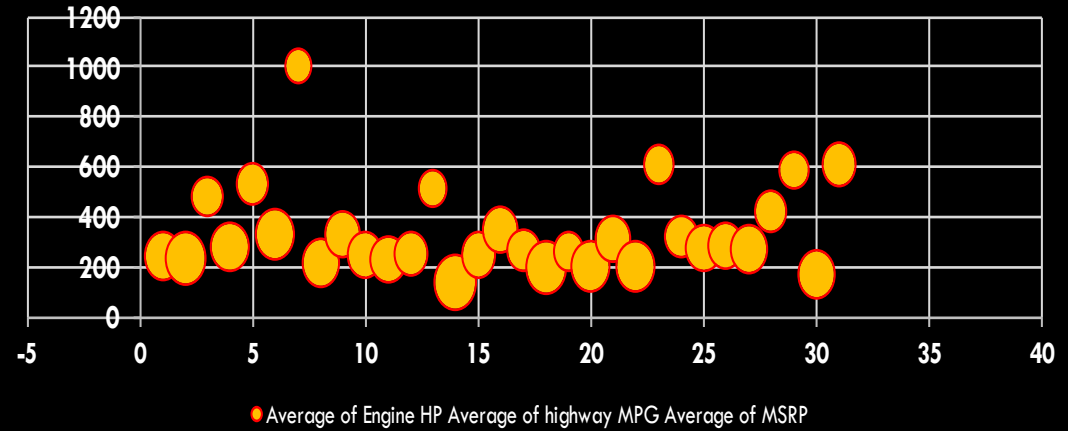
# DASHBOARD

Sum of MSRP



Make

Average of Engine HP Average of highway MPG Average of MSRP



MSRP

2000

2002

2003

Vehicle Style

4dr SUV

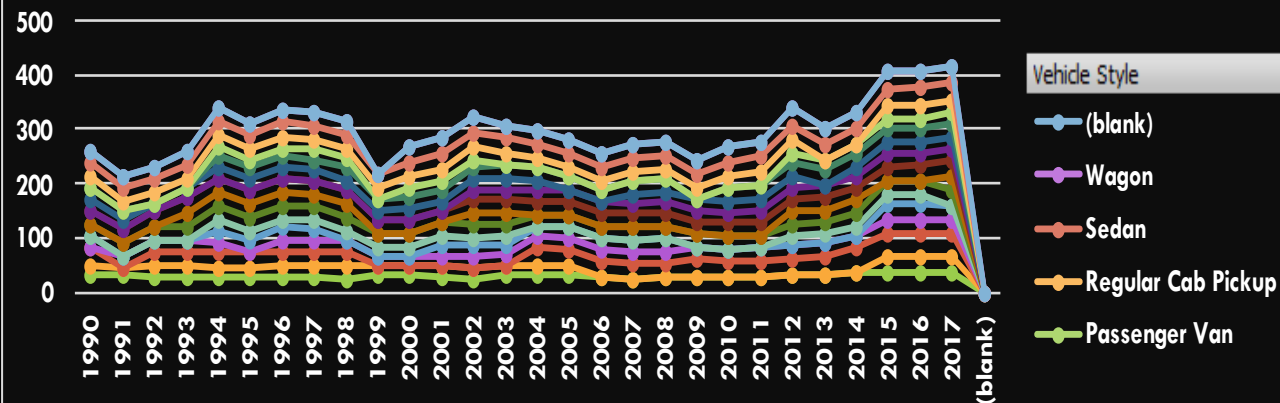
Cargo Minivan

Cargo Van

Convertible

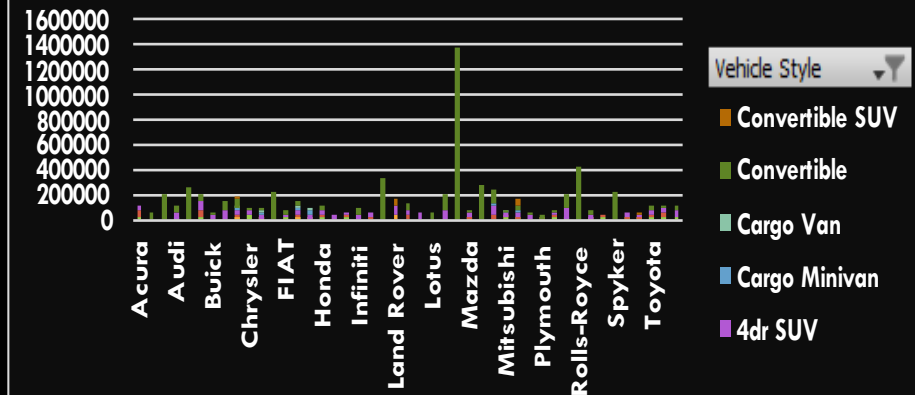
Convertible SUV

Average of highway MPG



Year

Average of MSRP



Make

Vehicle Style

2dr Hatchback

2dr SUV

4dr Hatchback

4dr SUV

Cargo Minivan

Cargo Van

Convertible

Convertible SUV

# INSIGHTS

- **A. DODGE, FORD, PLYMOUTH HAS GOT HIGHEST SUM OF MSRP.**
- **B. MAYBACH, BUGATI, ROLLS-ROYCE HAVE HIGH AVERAGE MSRP THAN OTHERS IN WHICH VEHICLE STYLE LIKE 4DR HATCHBACK AND CONVERTIBLE HAVE HIGH MSRP.**
- **C. 2DR SUV TEND TO HAVE MAINTAINED SAME AVERAGE HIGHWAY MPG IN YEARS. SEDAN EXHIBIT HIGHEST HIGHWAY MPG ACROSS THE YEARS.**
- **D. CAR'S HORSEPOWER, MPG, AND PRICE VARY ACROSS DIFFERENT BRANDS INDICATING THEY ALTER WITH VEHICLE STYLE AND PERFORMANCE.**

# RESULTS OF THE PROJECT

- UNDERSTOOD EXCEL FUNCTIONS AND THEIR USAGE MUCH BETTER.
- GOT FAMILIAR WITH EXCEL.
- GOT TO KNOW ABOUT ADVANCED EXCEL FUNCTIONS.
- UNDERSTOOD HOW TO PLOT VARIOUS GRAPHS.

**THANK YOU**