



# ANALYZING THE IMPACT OF CAR FEATURES ON PRICE AND PROFITABILITY

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# WELCOME TO PRESENTATION

The automotive industry is evolving rapidly, with increasing competition and shifting consumer preferences. To stay competitive, manufacturers must optimize pricing and product development by leveraging data-driven insights.

# INTRODUCTION



## Overview of the Project and Its Purpose

This project aims to help a car manufacturer optimize product development decisions by analyzing the relationship between car features, market category, and pricing. Using data analytics techniques, the project provides insights into consumer preferences and profitability drivers, enabling strategic decision-making.



## Business Problem or Question

The key business question addressed is: **How can a car manufacturer optimize pricing and product development to maximize profitability while meeting consumer demand?**

This involves identifying the most popular and profitable car features, understanding market trends, and developing pricing strategies that balance consumer preferences with profitability.

## Description of the Data Sources

The dataset includes information on various car models, their features, pricing, market category, and sales performance. Data may come from manufacturer records, industry reports, consumer surveys, and online car sales platforms. It's been given by Trainity to the candidates working on data analysis.



## Description of Data Cleaning and Preprocessing

- Handling Missing Values: Imputing missing values for essential attributes.
- Data Formatting: Standardizing units.
- Removing Duplicates: Eliminating redundant records to ensure accuracy.
- Feature Engineering: Creating new variables from the given data.
- Encoding Categorical Data: Converting categorical variables into visualization.

## Assumptions Made

- Consumer preferences and market trends remain relatively stable over the analysis period.
- Data is representative of the broader market and accurately reflects real-world sales trends.
- The relationship between car features and pricing follows a predictable pattern that can be captured using statistical and machine learning models.
- External factors such as government policies, fuel prices, and economic conditions have a measurable but consistent impact on car sales and pricing.



# APPROACH



## Analytical Methods Used in the Project (Car Features Analysis)

The analysis of car features involves various analytical techniques to understand performance, pricing, fuel efficiency, and customer preferences. The primary methods used include:

# APPROACH

### **Descriptive Statistics:**

- Summarizes key attributes such as engine size, fuel efficiency (MPG), and price distribution.
- Identifies patterns in car categories (SUVs, sedans, electric, hybrid, etc.) and how features impact pricing.

### **Data Visualization:**

- Histograms & Boxplots: Show the distribution of numerical features like price.
- Scatter Plots: Display relationships between fuel efficiency and engine size or weight.
- Heatmaps: Correlation between features (e.g., weight vs. fuel efficiency).

### **Machine Learning:**

- Regression Models to predict car price based on features.

### **Optimization Techniques:**

- Feature selection techniques are used to determine which car features impact price and performance the most.
- Multi-objective optimization.

## Reasoning Behind the Choice of Analytical Methods

The methods were chosen to effectively analyze, visualize, and predict car features and their impact on pricing and efficiency:

### ✓ **Descriptive Statistics –**

Helps summarize the key attributes of cars.

### ✓ **Visualization –**

Provides insights into trends and relationships between car features.

## Modeling Techniques Used -

### **Linear Regression –**

Predicts car prices based on features like horsepower, brand, and engine type.

## Challenges & Limitations Encountered -

Feature Correlation Issues, Data Availability, Model Complexity, and Subjectivity in Car Features.

# TECH STACK



# TECH STACK



## MS EXCEL

Ease of Data Management, Built-in Analytical Tools, Data Visualization Capabilities, Predictive & Optimization Features, Integration with AI & Automation, and Accessibility & Cost-Effectiveness.

## CANVA

Easy-to-Use Design Interface, Professional Visuals & Templates, Cost-Effective & Time-Saving, Collaboration & Cloud Access, Branding & Consistency, Integration with Other Tools, and Data Visualization & Infographics.

## LOOM

Quick & Easy Screen Recording, Effective Communication, Enhances Collaboration & Feedback, Integration with Other Tools, Cloud-Based & Instant Sharing, Time-Saving & Productivity Boost.



# CAR FEATURES IMPACT



Insights

Results

Conclusion

# KEY INSIGHTS & FINDINGS FROM THE PROJECT

## Key Insights & Findings from the Project

Larger engine sizes tend to have lower fuel efficiency.

## Demand Trends

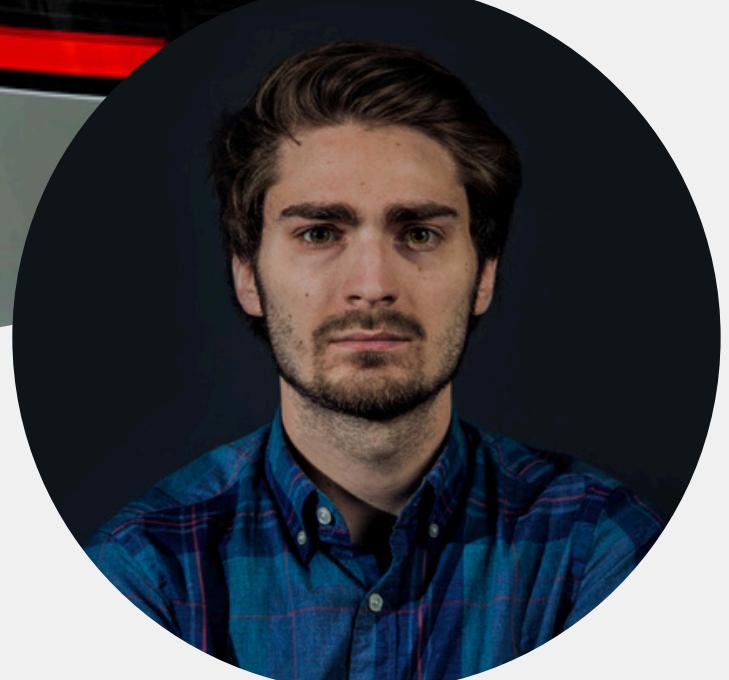
SUVs and electric vehicles are rising in consumer preference.

## Car Price vs. Features

Luxury brands have higher pricing even when performance is similar to mid-range brands

## Maintenance Costs

European brands have higher maintenance costs.



# HOW THE INSIGHTS RELATE TO THE BUSINESS PROBLEM

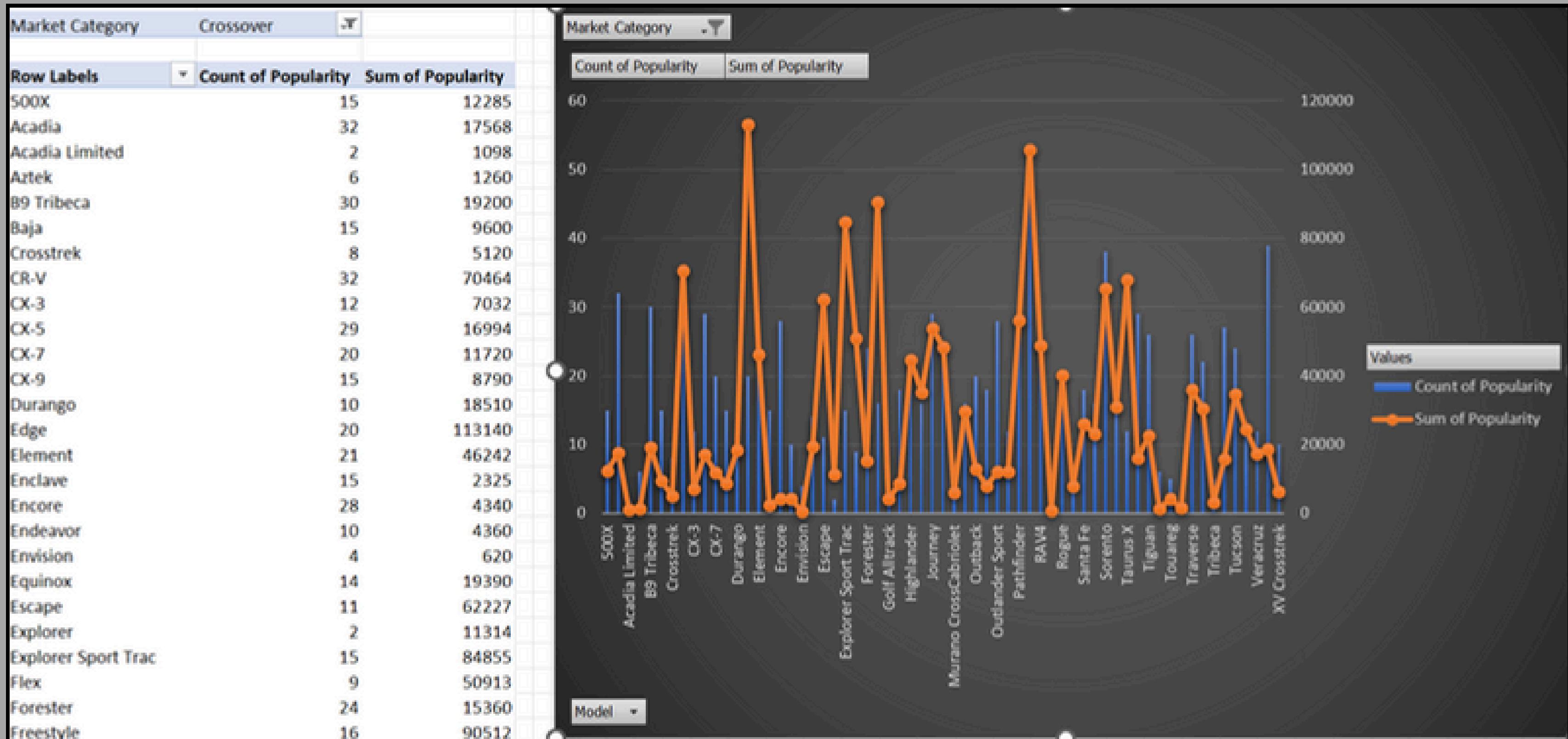


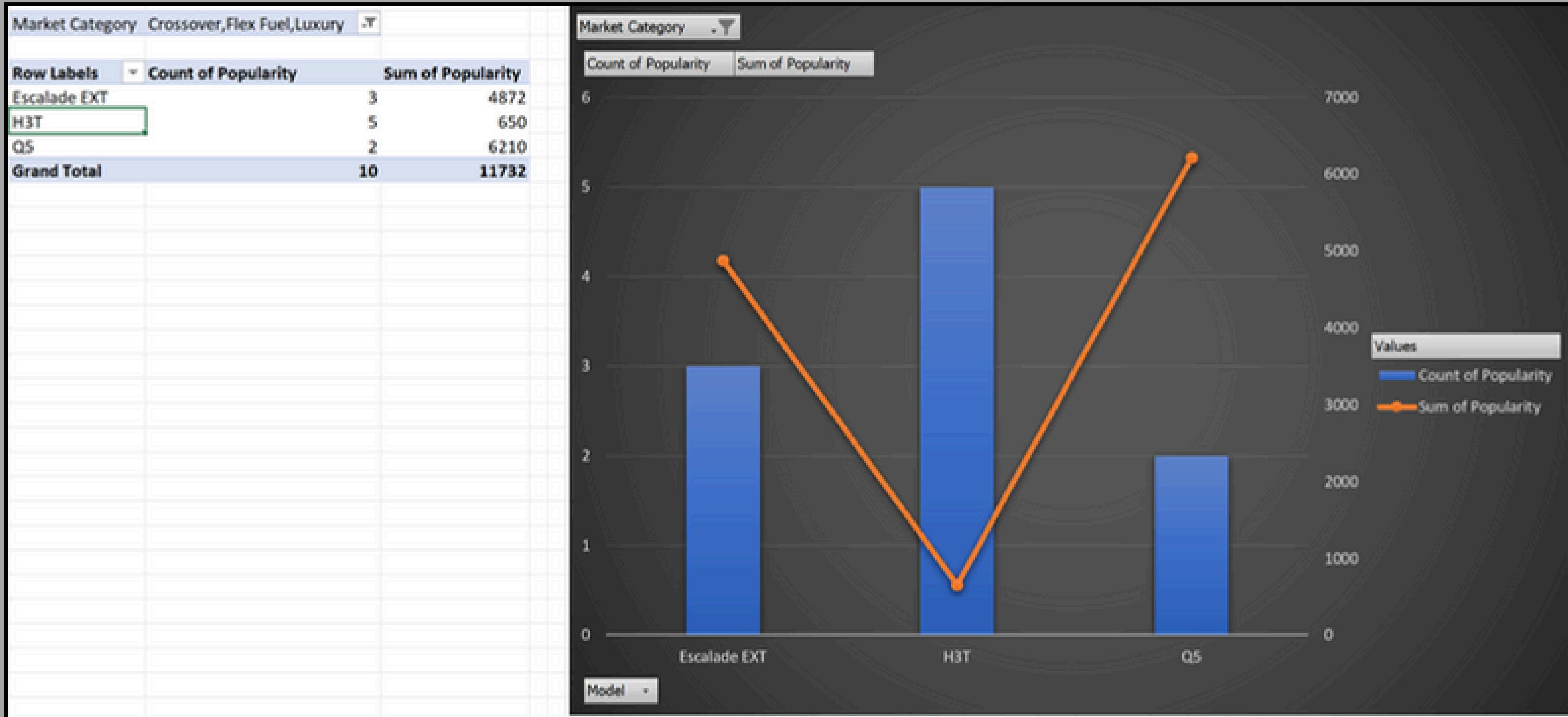
Helps in deciding which features to prioritize in new models based on market demand.

Insights on high-demand models and pricing strategies for different customer segments.

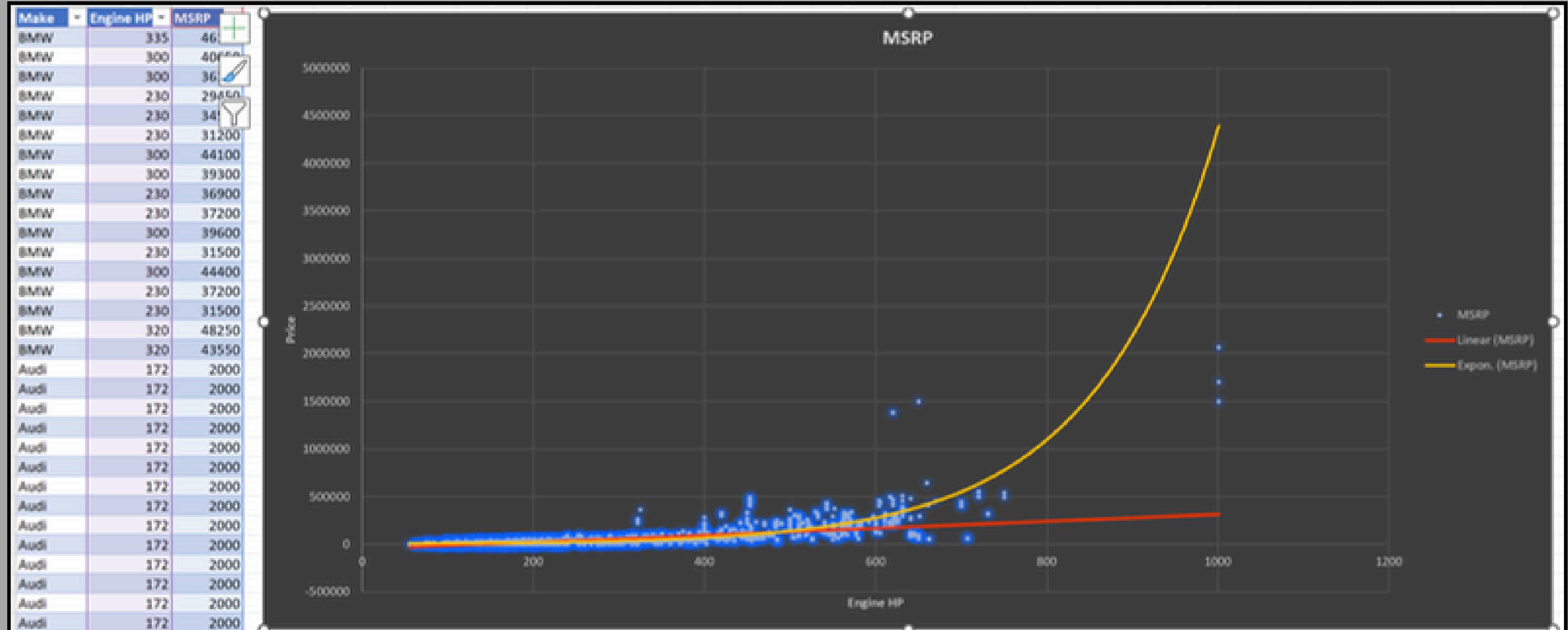
Helps buyers make informed decisions on car purchases based on budget and priorities.

# TASK 1





# **TASK 2**

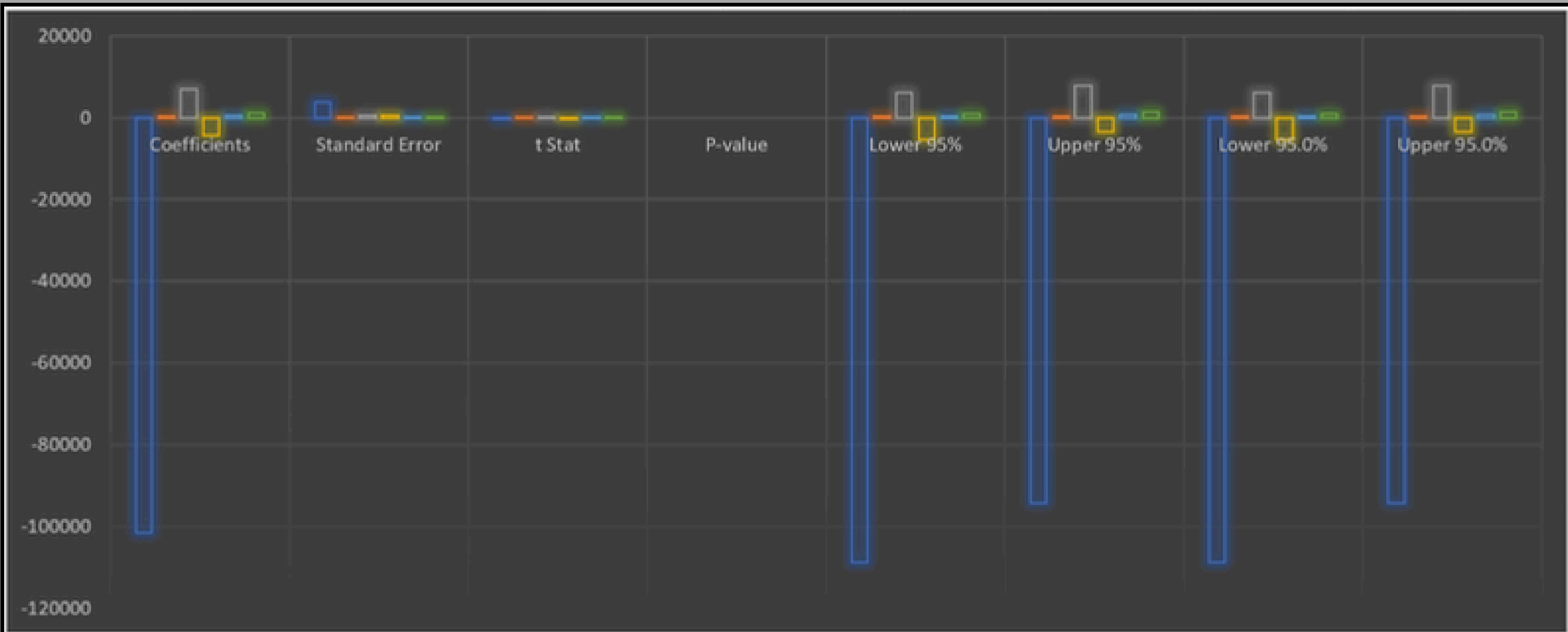


# TASK 3

	Engine HP	Engine Cylinders	Number of Doors	highway MPG	city mpg	MSRP		
Engine HP	1 0.779861884	-0.101943819	-0.41426303	-0.46603319	0.661827336			
Engine Cylinders	0.779861884	1 -0.137624414	-0.137624414	-0.62031255	-0.637874844	0.544001588		
Number of Doors	-0.101943819	-0.137624414	1 0.120960292	0.120960292	0.136642002	-0.127316325		
highway MPG	-0.414263027	-0.620312551	0.120960292	1 0.847022703	0.847022703	-0.198962171		
city mpg	-0.46603319	-0.637874844	0.136642002	0.847022703	1 -0.225316898	-0.225316898		
MSRP	0.661827336	0.544001588	-0.127316325	-0.19896217	-0.225316898	1 0.661827336		
VARIABLE 1	VARIABLE 2	CORRELATION	SIGN	MAGNITUDE		REMARKS		
Engine HP	MSRP	0.661827336	Positive	0.66		MSRP will increase with increase in Engine HP		
Engine Cylinders	MSRP	0.544001588	Positive	0.54		MSRP will increase with increase in Engine Cylinders		
Number of Doors	MSRP	-0.127316325	Negative	0.12		MSRP will decrease with increase in no. of doors		
highway MPG	MSRP	-0.198962171	Negative	0.19		MSRP will decrease with increase in highway MPG		
city mpg	MSRP	-0.225316898	Negative	0.22		MSRP will decrease with increase in city mpg		

## SUMMARY OUTPUT

Regression Statistics								
Multiple R	0.680708139							
R Square	0.46336357							
Adjusted R Square	0.463136297							
Standard Error	44170.77827							
Observations	11812							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5	1.98891E+13	3.97782E+12	2038.799457	0			
Residual	11806	2.30342E+13	1951057653					
Total	11811	4.29233E+13						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-101601.736	3684.351697	-27.57655738	2.765E-162	-108823.673	-94379.79896	-108824	-94379.8
Engine HP	322.7465574	6.01767382	53.63310924	0	310.9509241	334.5421906	310.9509	334.5422
Engine Cylinders	6989.177662	439.6449924	15.89732121	2.53591E-56	6127.400961	7850.954363	6127.401	7850.954
Number of Doors	-4472.158125	465.7180593	-9.602715711	9.35015E-22	-5385.042338	-3559.273912	-5385.04	-3559.27
highway MPG	570.1808088	105.7839778	5.390048859	7.17937E-08	362.826764	777.5348535	362.8268	777.5349
city mpg	1163.755457	121.9978136	9.539150113	1.72109E-21	924.61962	1402.891294	924.6196	1402.891



## Coefficients vs variables



Analysis

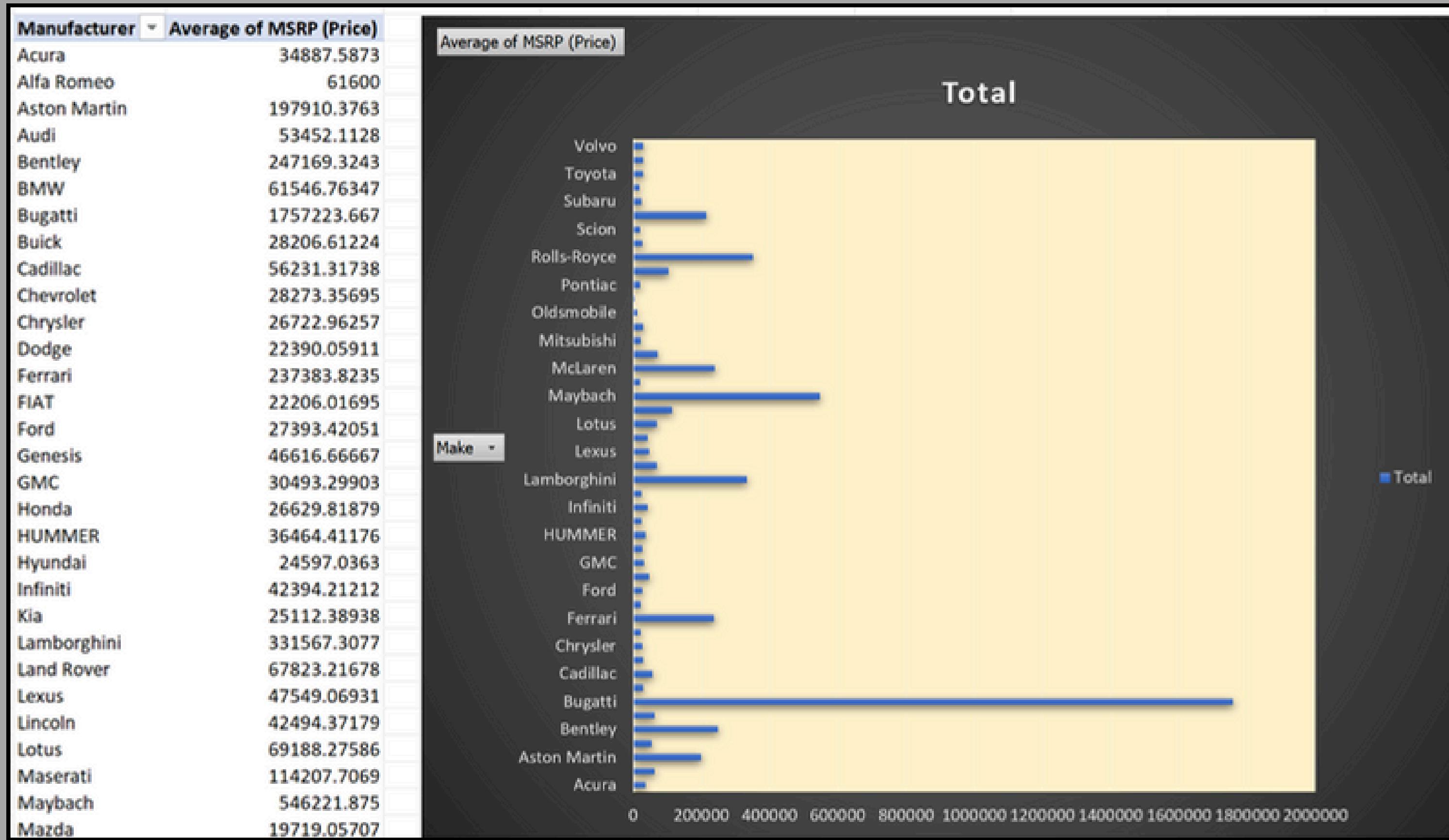
Strong relationship with car price

Least relationship with car price

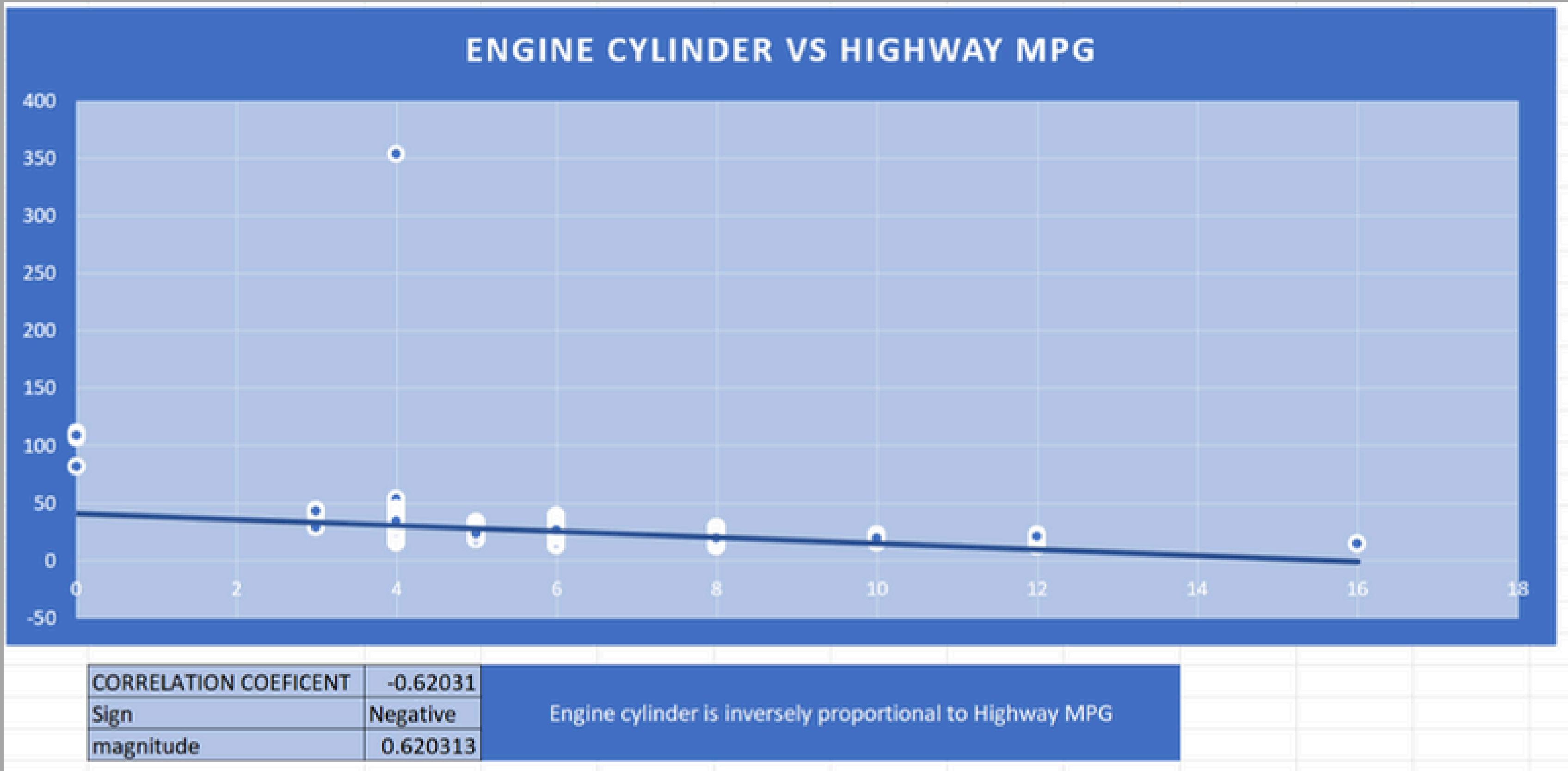
Engine Cylinders

No. Of Doors

# TASK 4

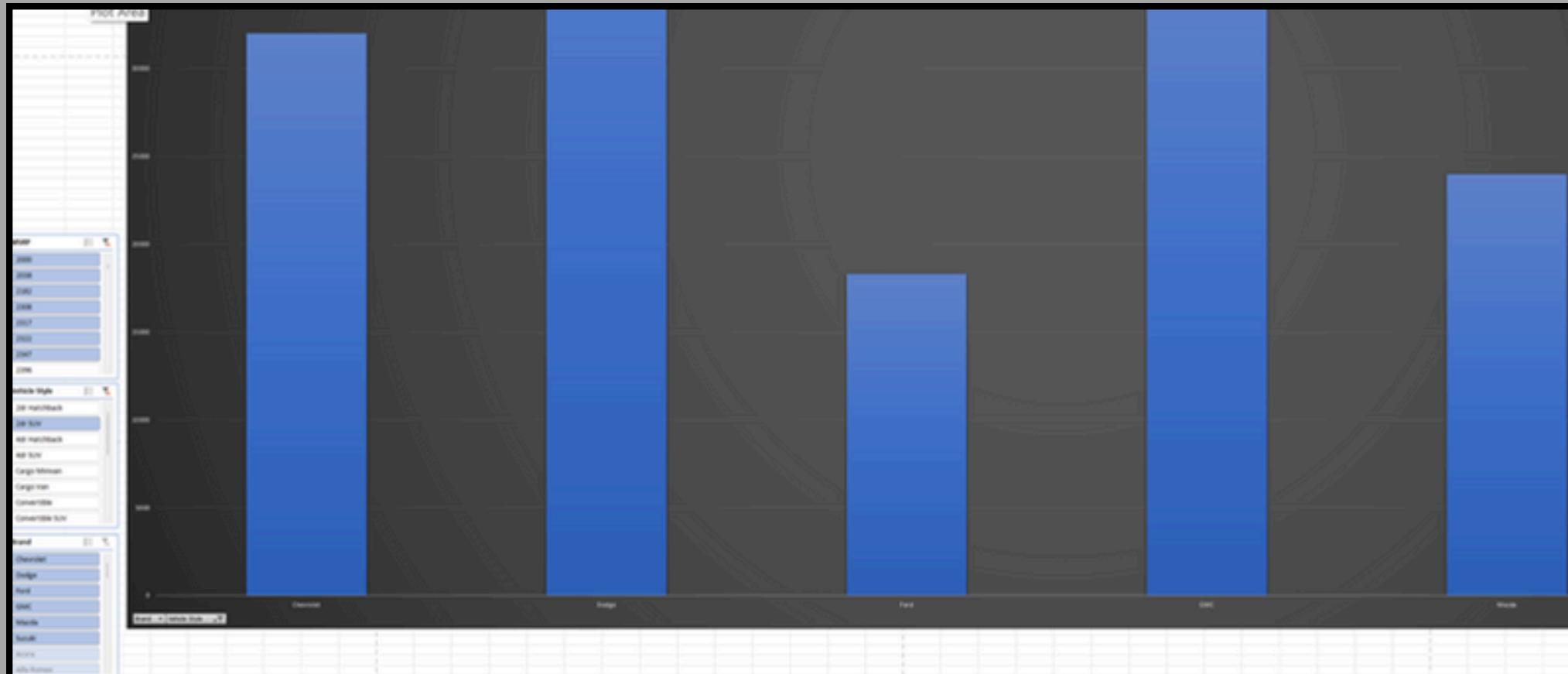
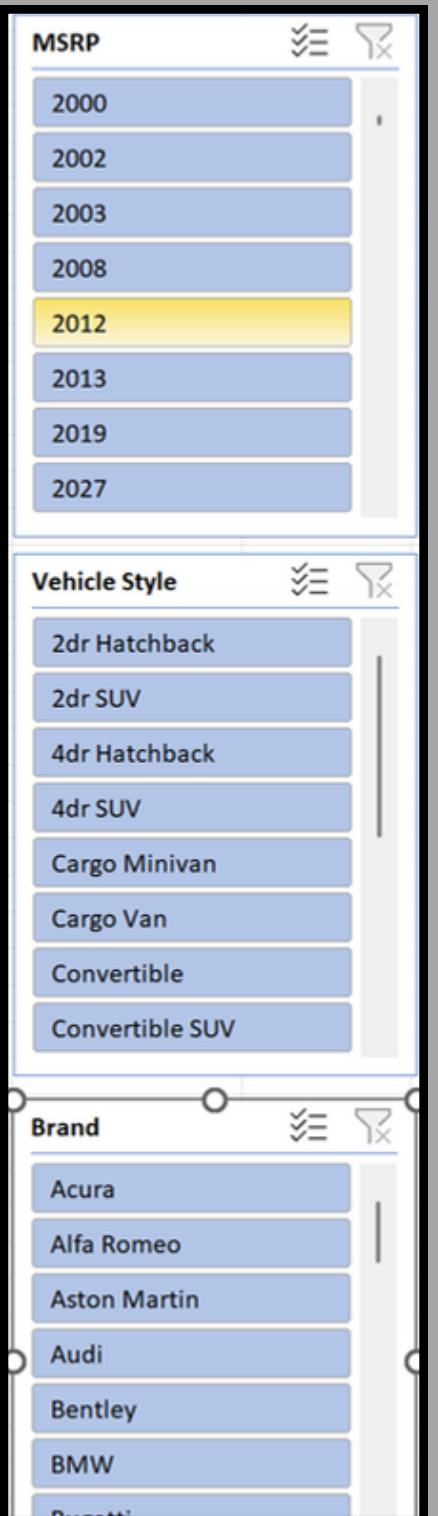


# TASK 5

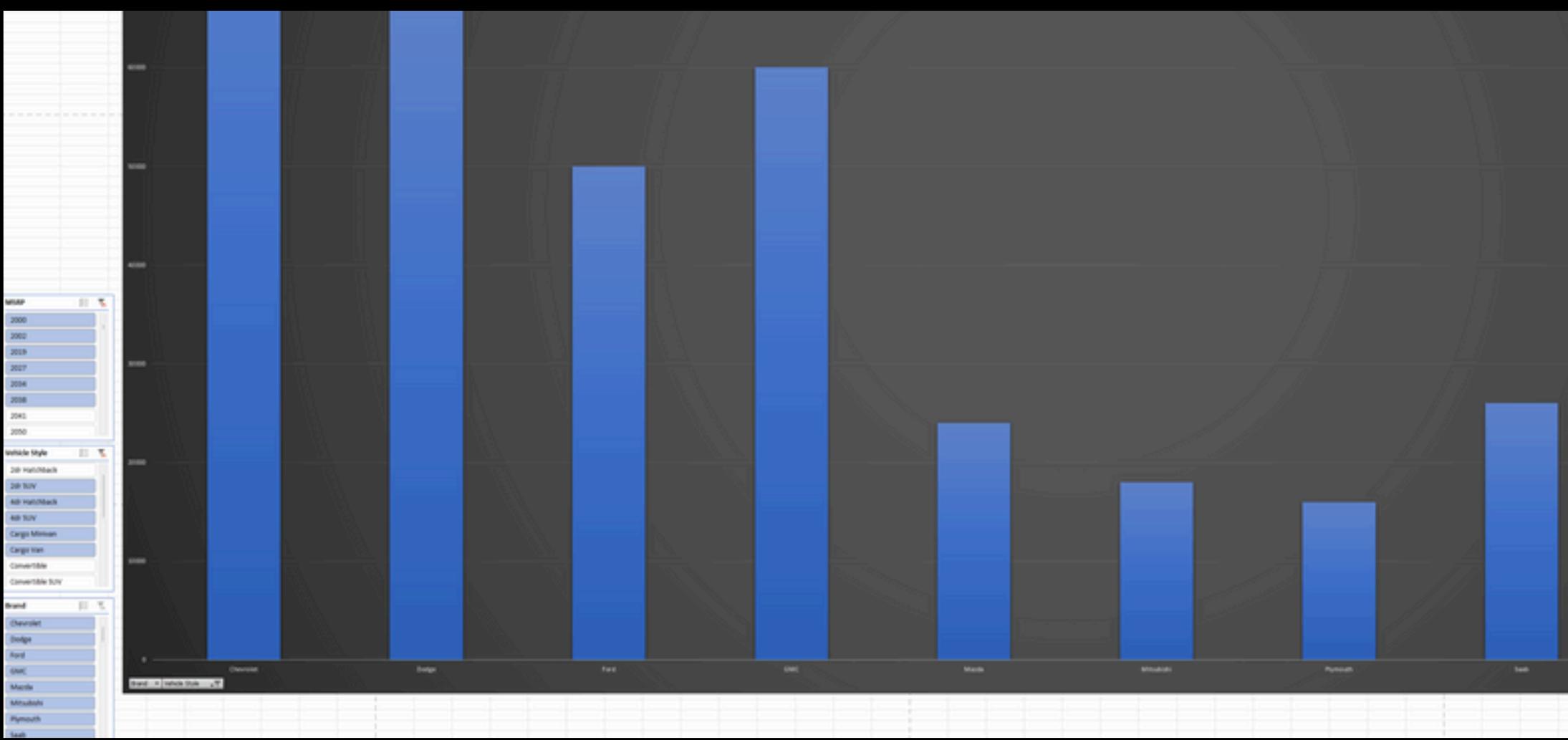
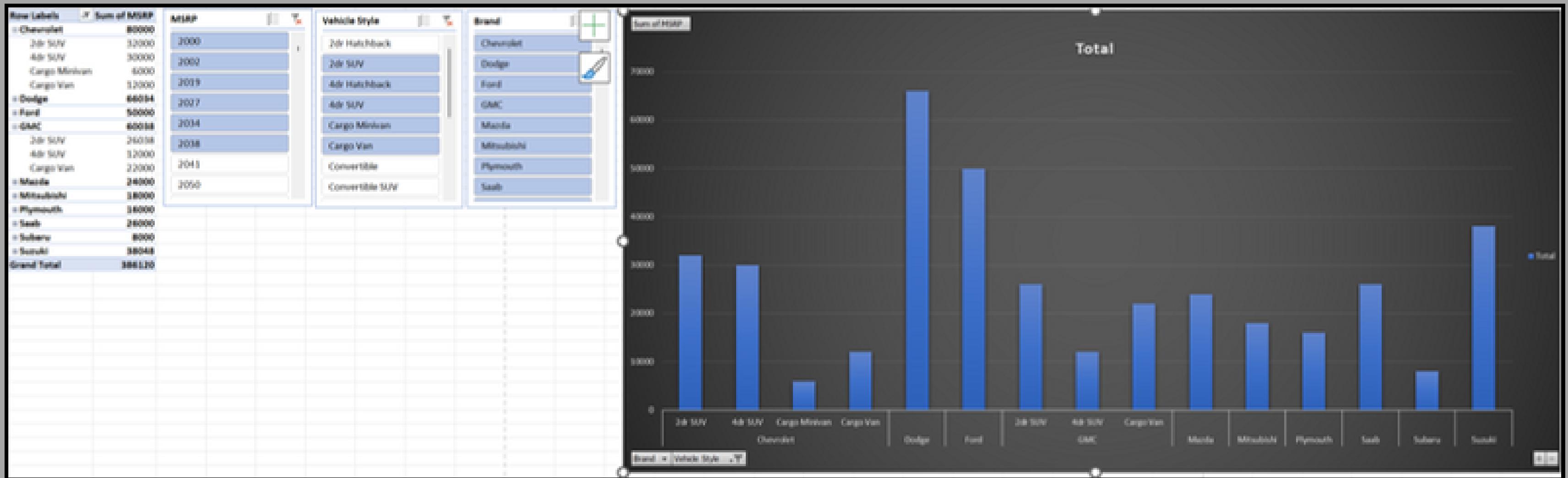


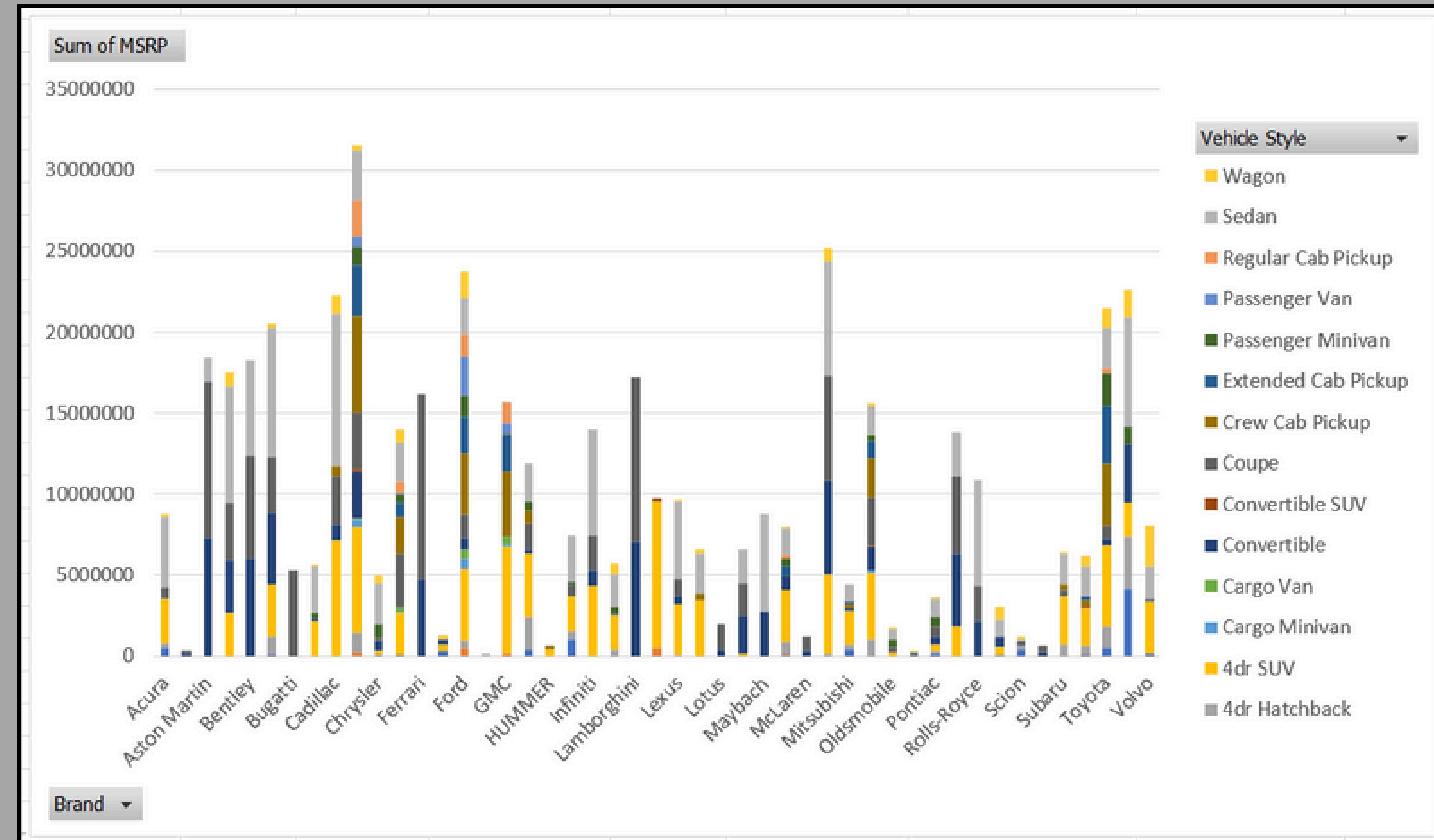
# Dashboard 1

Row Labels	Sum of MSRP
■ Acura	8791672
2dr Hatchback	480917
4dr Hatchback	357440
4dr SUV	2663505
Coupe	793748
Sedan	4294702
Wagon	201360
■ Alfa Romeo	308000
■ Aston Martin	18405665
■ Audi	17532293
■ Bentley	18290530
■ BMW	20556619
■ Bugatti	5271671
■ Buick	5528496
■ Cadillac	22323833
■ Chevrolet	31524793
■ Chrysler	4997194

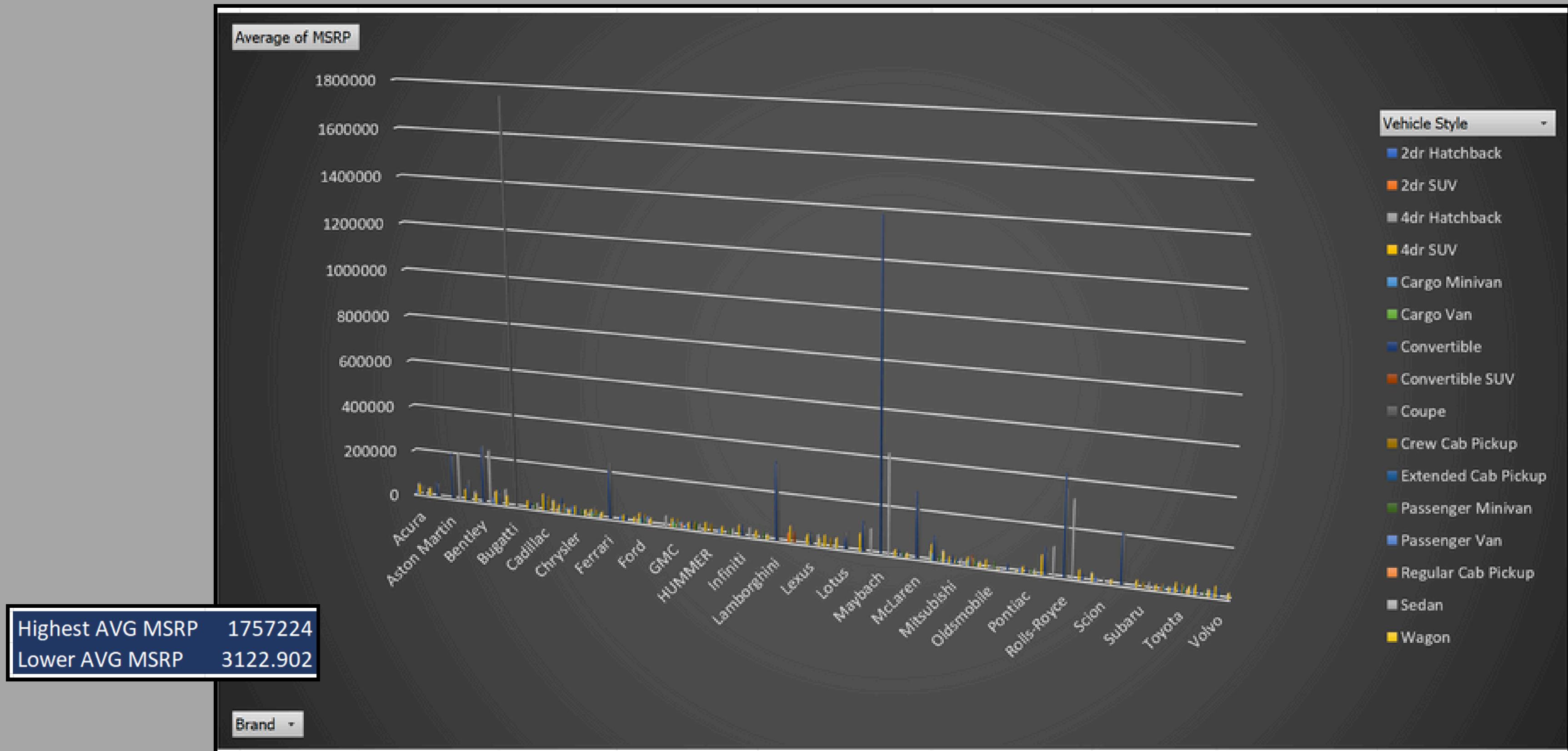


Higher Sum MSRP      479093956  
Lower Sum MSRP      139850

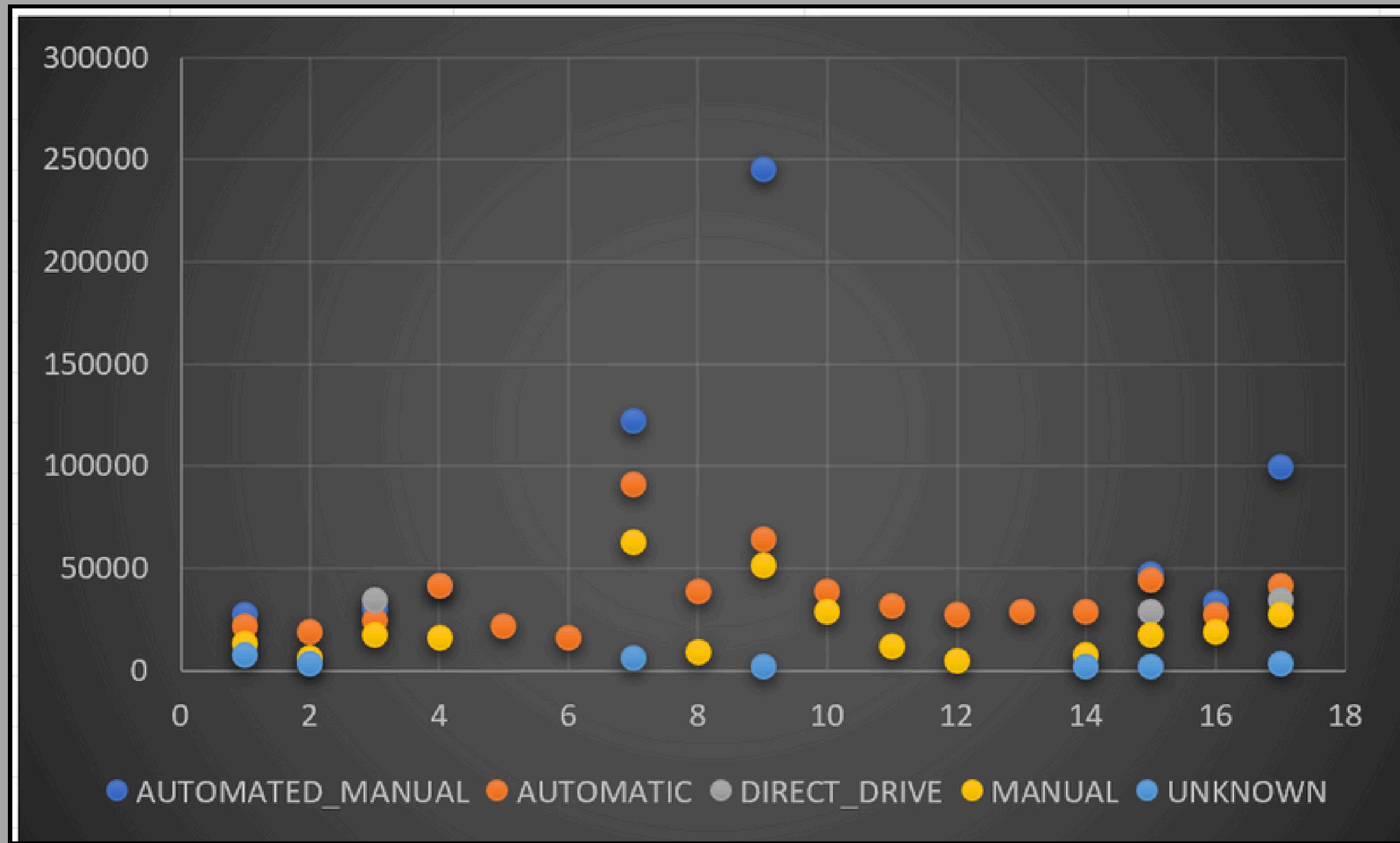




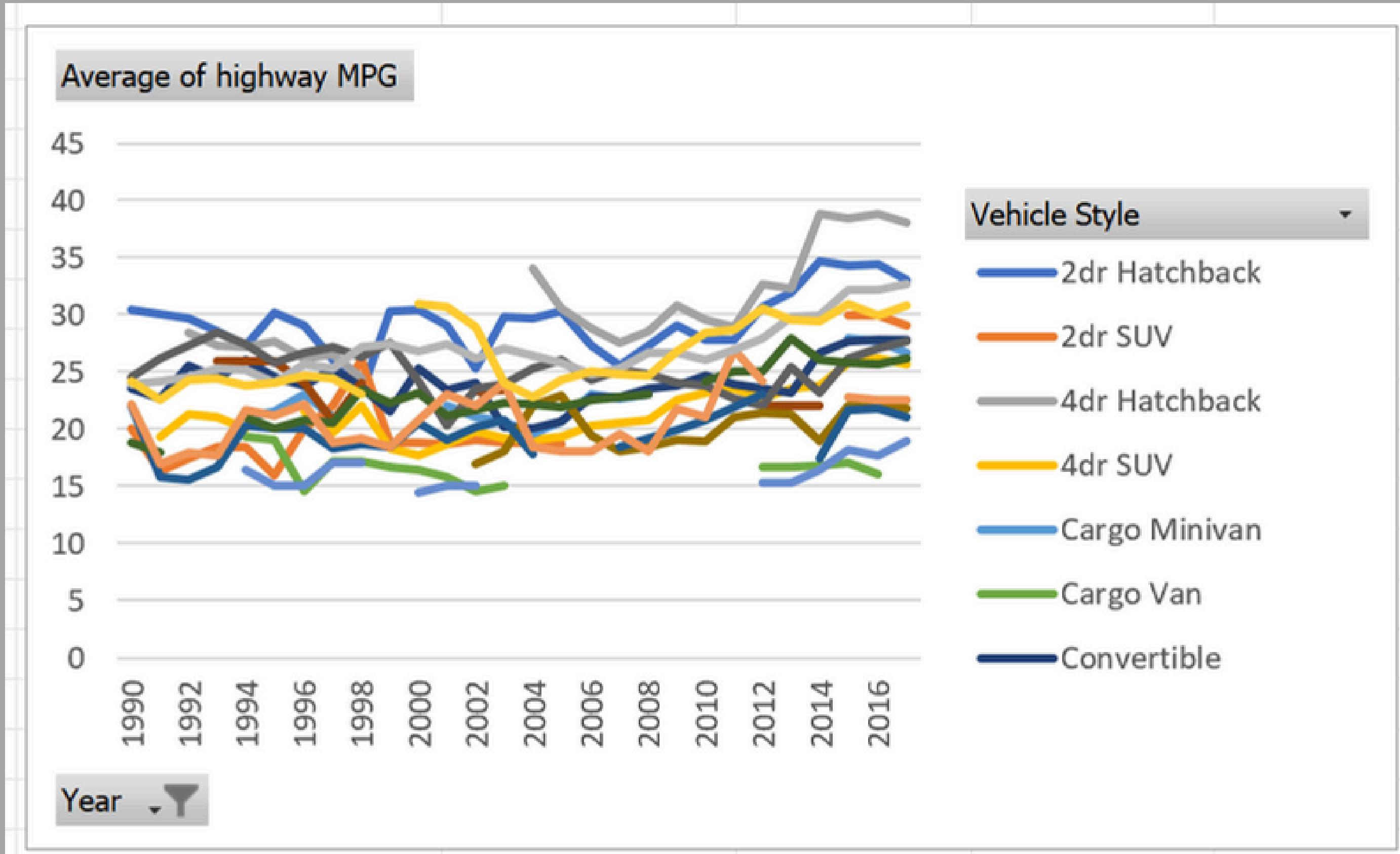
# Dashboard 2

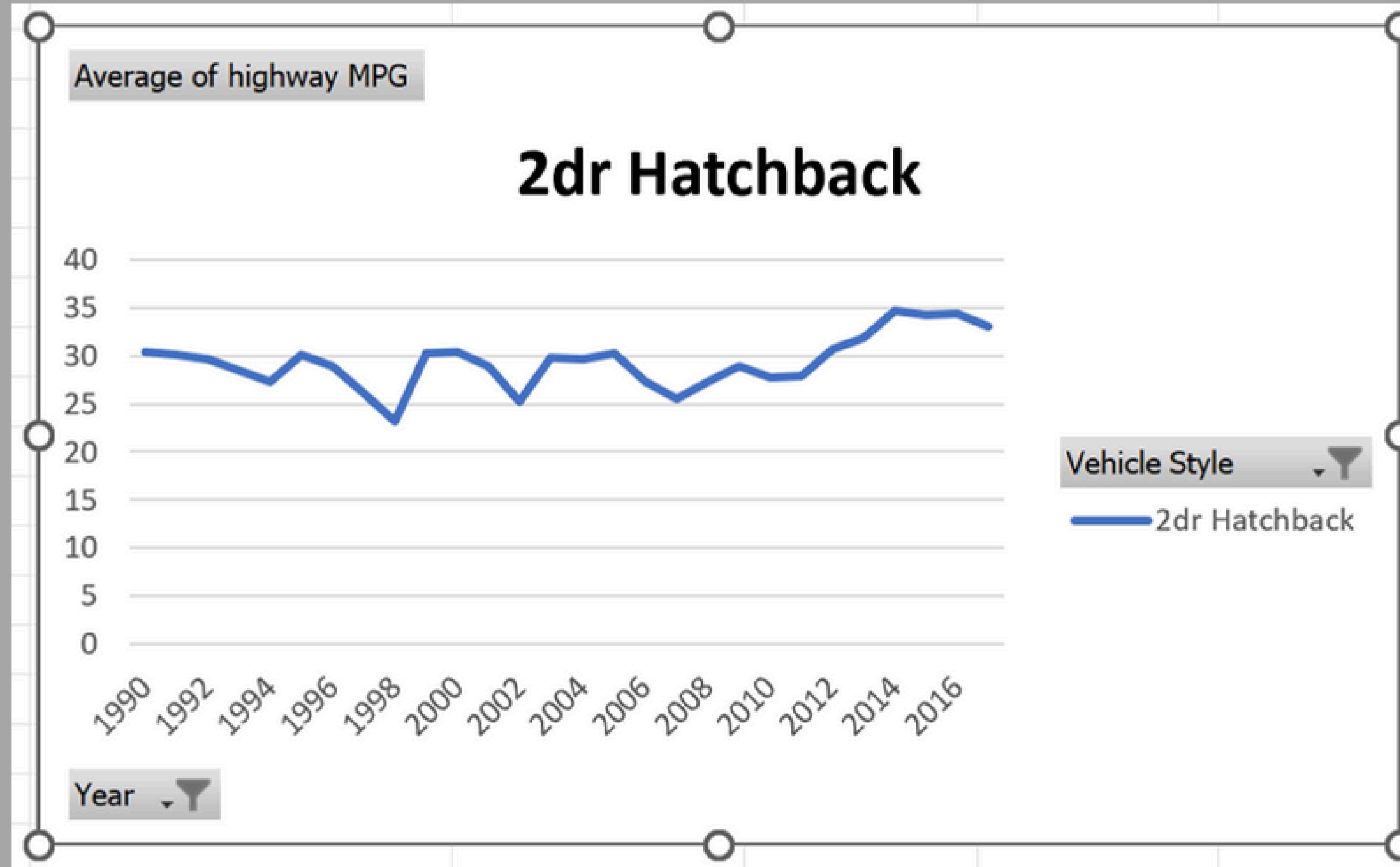


# Dashboard 3

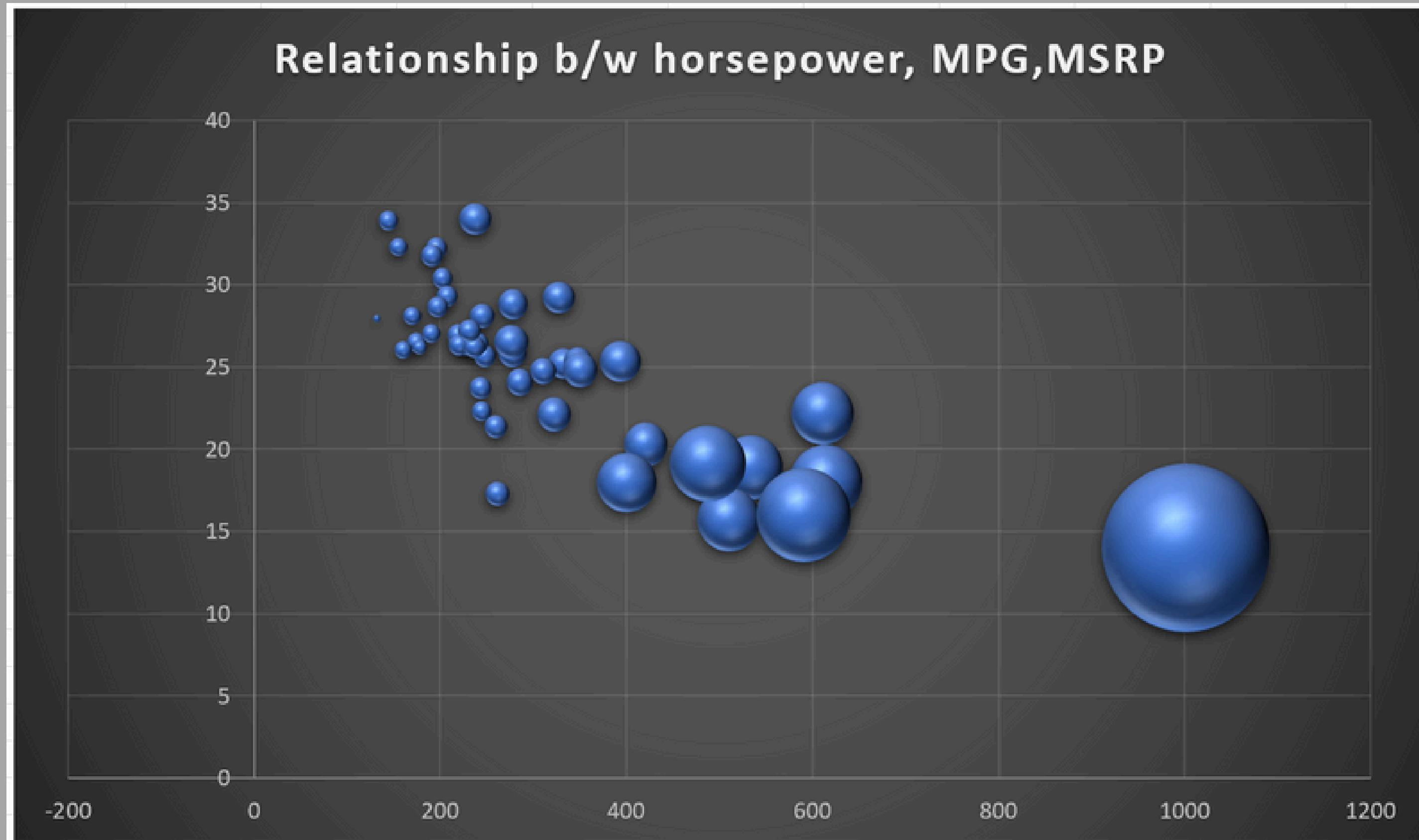


# Dashboard 4





# Dashboard 5



# RECOMMENDATIONS & CONCLUSIONS

- Increase Focus on Electric & Hybrid Vehicles – With rising fuel costs and environmental concerns, investing in EV technology is crucial.
- Feature Optimization for Affordability – Brands should balance luxury features with cost to attract budget-conscious buyers.
- Promote Safety Features – Since safety features strongly influence pricing, marketing efforts should highlight them.
- Reduce Maintenance Costs for Competitive Advantage – Brands should work on cost-effective servicing solutions to enhance customer loyalty.



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**THANK  
YOU!**