ANALYZING THE IMPACT OF CAR FEATURES ON PRICE AND PROFITABILITY

……Trainity Project……
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ANALYZING THE IMPACT OF CAR FEATURES ON PRICE AND PROFITABILITY

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-Tech Stack Used
-Insights
-Results

Project description

The automotive industry is evolving rapidly with a focus on fuel efficiency, sustainability, and innovation. It's essential to understand the factors that drive consumer demand for cars. The trend towards electric and hybrid vehicles exists, but traditional gasoline-powered cars still dominate the market.

To optimize pricing and product development decisions to maximize profitability while meeting consumer demand. By analyzing a car's features, market category, and pricing, manufacturers can develop a pricing strategy that balances consumer demand with profitability. Identifying popular features and categories to focus on for future product development efforts, improve competitiveness, and increase profitability over time.

The dataset contains the information of various cars information

- Number of observations: 11,159
- Number of variables: 16
- File type: CSV (Comma Separated Values)

Approach

Analysis Approach: The analysis will include identifying missing data and using appropriate methods to handle it, identifying outliers and data imbalances. For analysis I have used descriptive statistics.firstly I clean the dataset and then finding the insights from data.

Missing Data: Missing data will be identified and replaced with an appropriate value or removed, depending on the context. Outliers: Outliers will be identified and explained in business terms, but will not necessarily be removed.

Visualization: The analysis will include visualizations to summarize important results, and insights will explain why variables are important for differentiating clients with payment difficulties from all other cases.

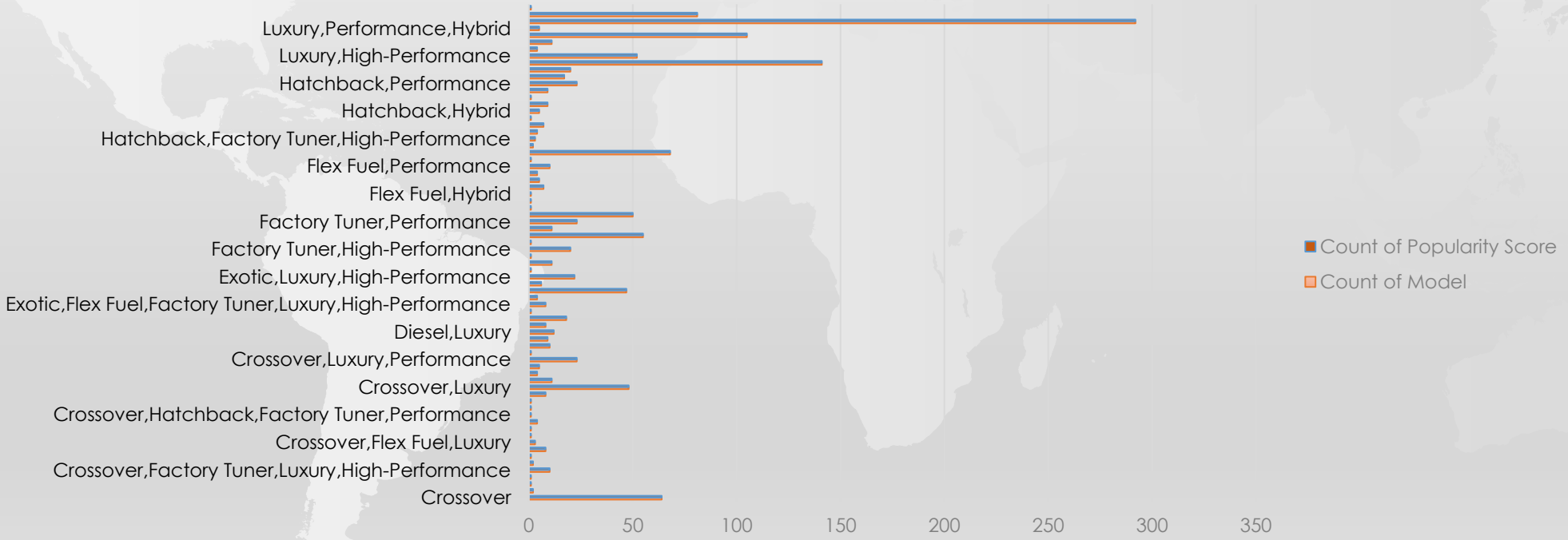
Tech stack used

➢ **Microsoft excel 365**
I have used Microsoft excel to do this project, because excel provide a all features that are used for data analysis and finding insights from data.
Excel provides a better visualization graph.
➢ **Microsoft powerpoint**
For making the project report I have used Microsoft powerpoint.

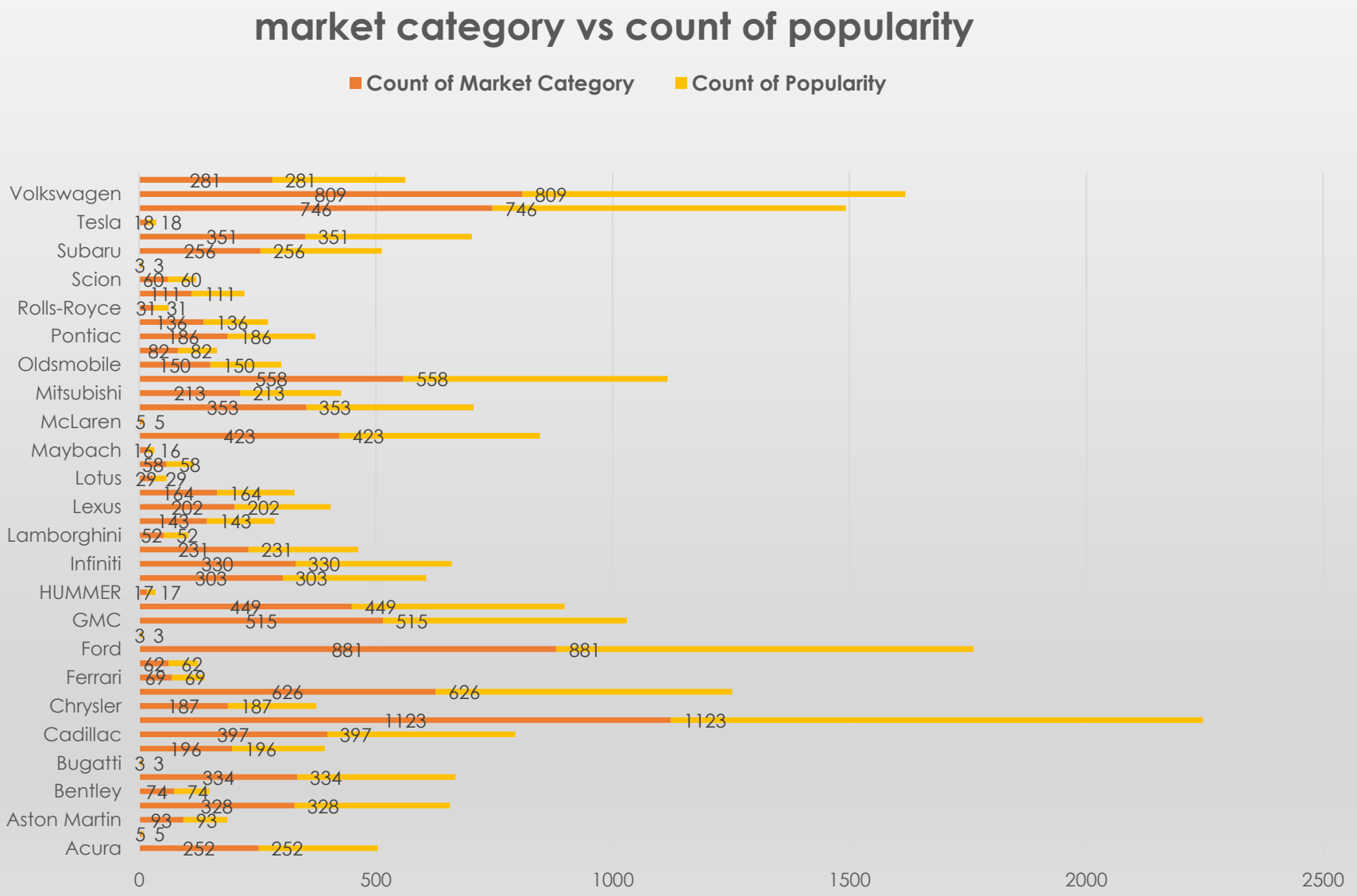
Insights

Based on the insights, a flat trend line suggests that the data being analyzed is stable and consistent, with no clear trend in any particular direction.
The most popular car models are Ford-Aerostar, Aspire, and Bronco II with a popularity score of 5657, of the market category Hatchback, Hybrid and Factory Tuner.

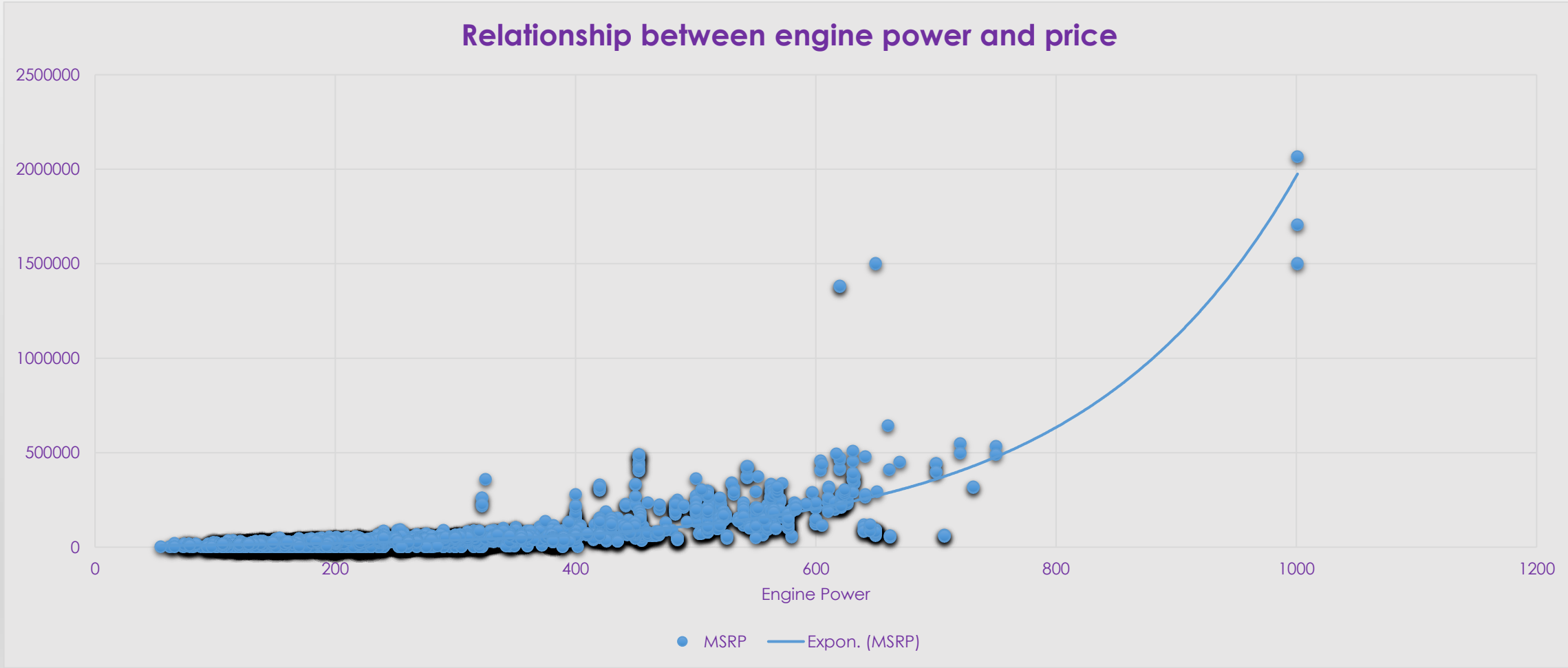
A. Number of car models in each market category and their corresponding popularity scores.



The volkswagon and tesla having most popularity



Majority of the engine power which is between 200 HP to 800 HP are under 5,00,000 price and the highest being at 2M of 1000 HP engine power.
it indicates that there is a positive relationship between engine power and price - as engine power increases, price also tends to increase. However, most of the engine power are found to be under 5lacs and at the highest being 2M



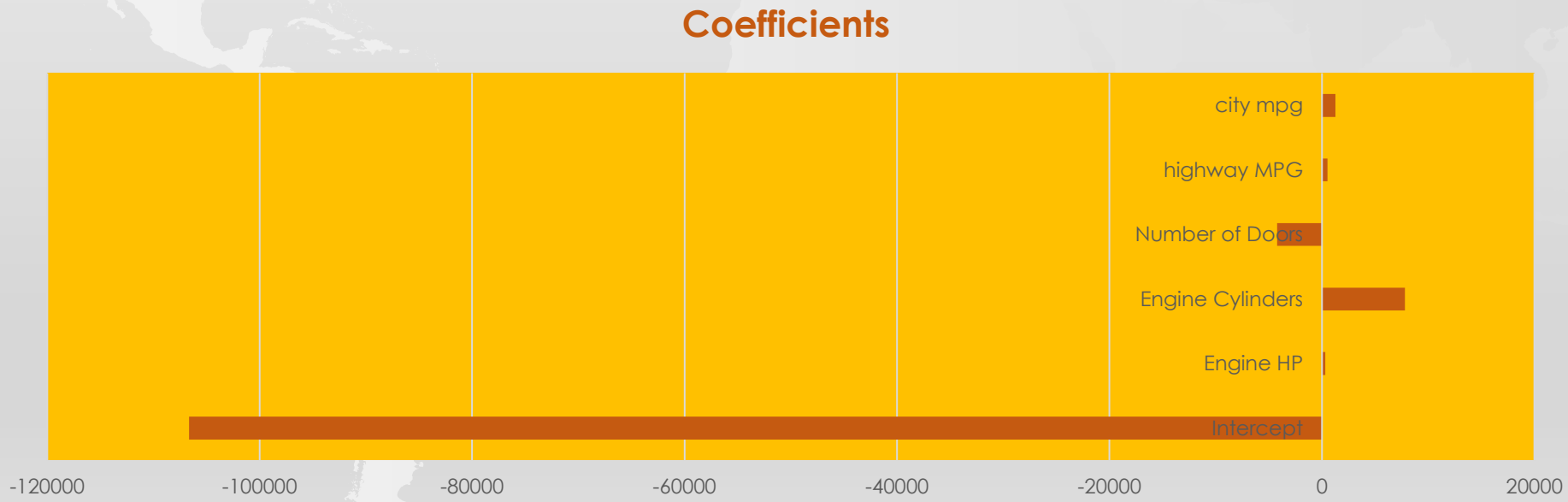
IT CAN BE NOTICED THAT THESE VARIABLES HAVE THE HIGHEST COEFFICIENT VALUE WHICH DENOTES THAT THEY HAVE A VERY STRONG RELATIONSHIP WITH THE INDEPENDENT VARIABLE.

Regression Statistics	
Multiple R	0.666487219
R Square	0.444205213
Adjusted R Square	0.443930258
Standard Error	46168.11505
Observations	10113

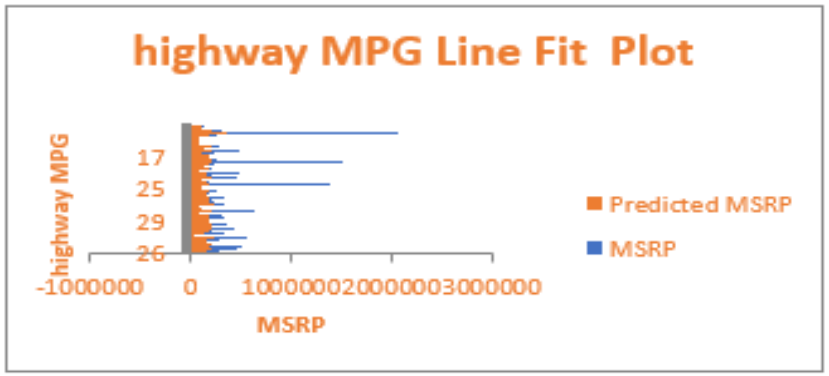
ANOVA

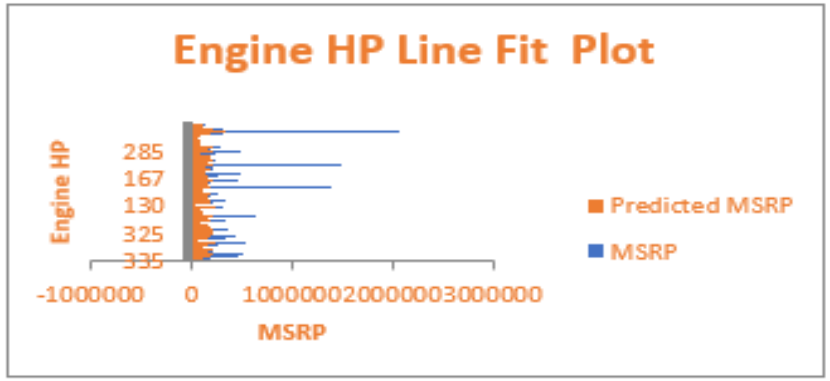
	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	1.72177E+13	3.44354E+12	1615.553868	0
Residual	10107	2.1543E+13	2131494847		
Total	10112	3.87607E+13			

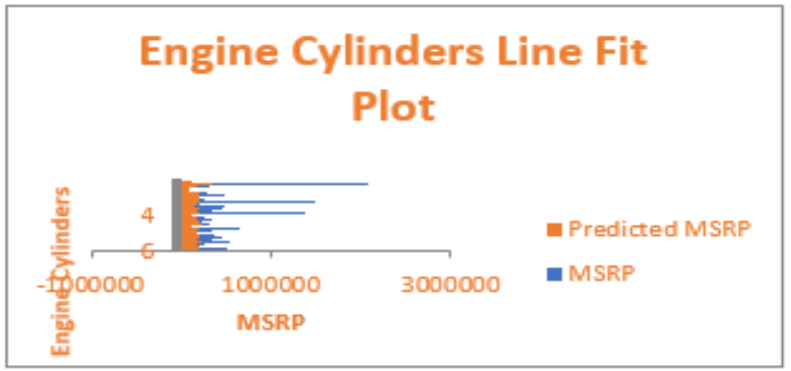
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-106641.488	4183.173564	-25.49296279	5.4687E-139	-114841.3395	-98441.63652	-114841.3395	-98441.63652
Engine HP	318.0612605	6.964940442	45.66604168	0	304.4085931	331.7139279	304.4085931	331.7139279
Engine Cylinders	7804.40654	493.7604133	15.80605964	1.3065E-55	6836.538006	8772.275074	6836.538006	8772.275074
Number of Doors	-4221.213744	536.7428942	-7.864498608	4.08436E-15	-5273.336483	-3169.091006	-5273.336483	-3169.091006
highway MPG	522.2623558	114.0741641	4.578270284	4.74435E-06	298.6543244	745.8703873	298.6543244	745.8703873
city mpg	1269.889818	135.4688534	9.374035333	8.47746E-21	1004.343944	1535.435692	1004.343944	1535.435692

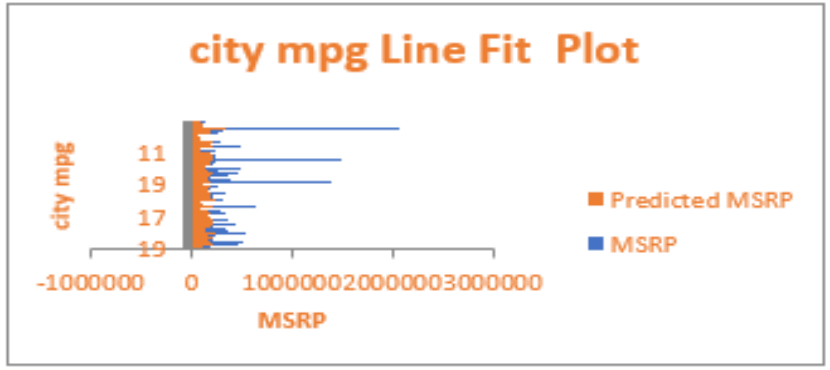


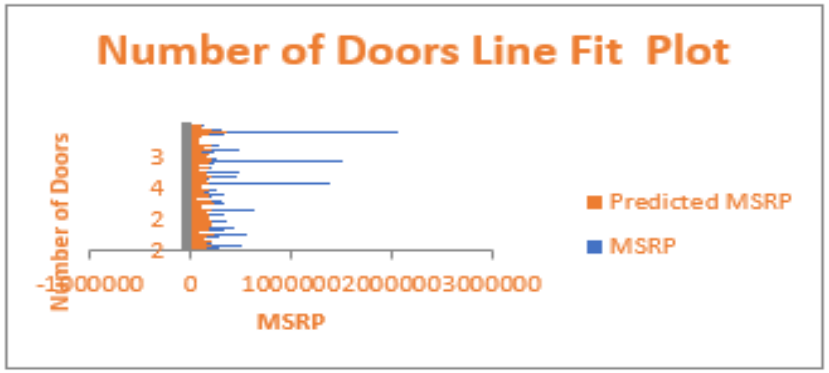
•a bar chart that shows the coefficient values for each variable to visualize their relative importance.





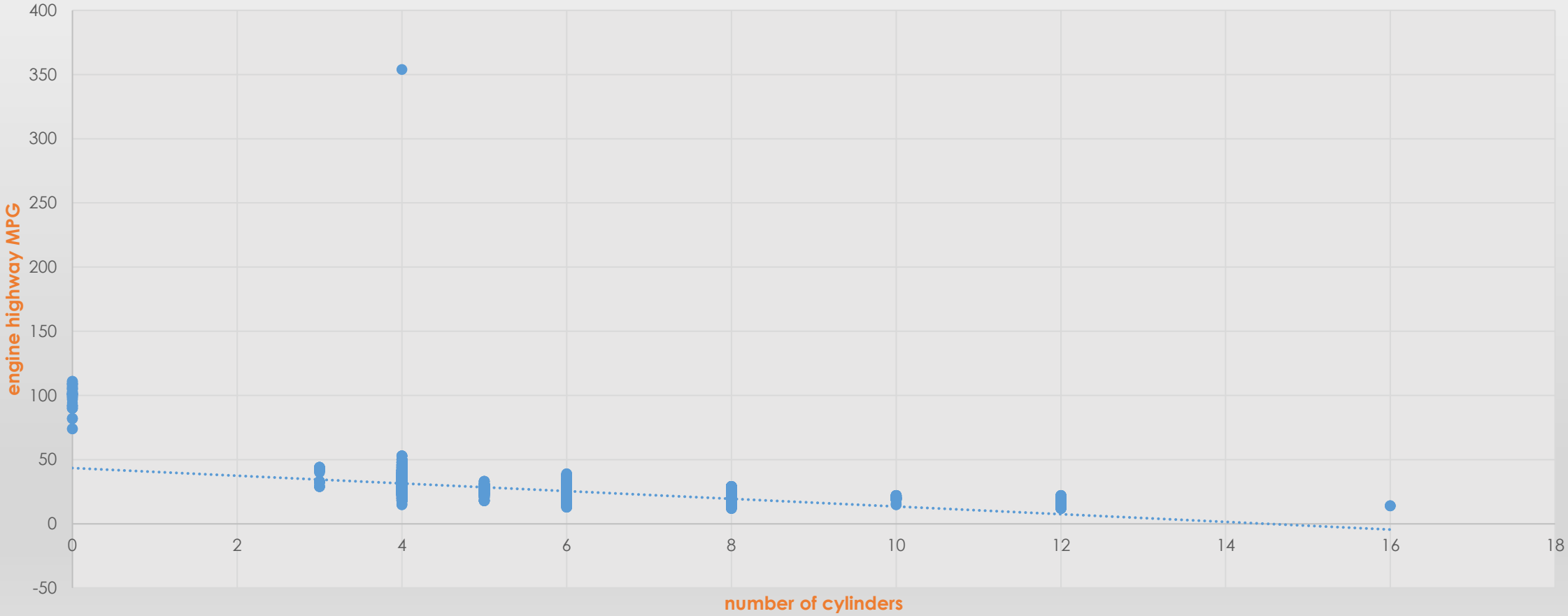




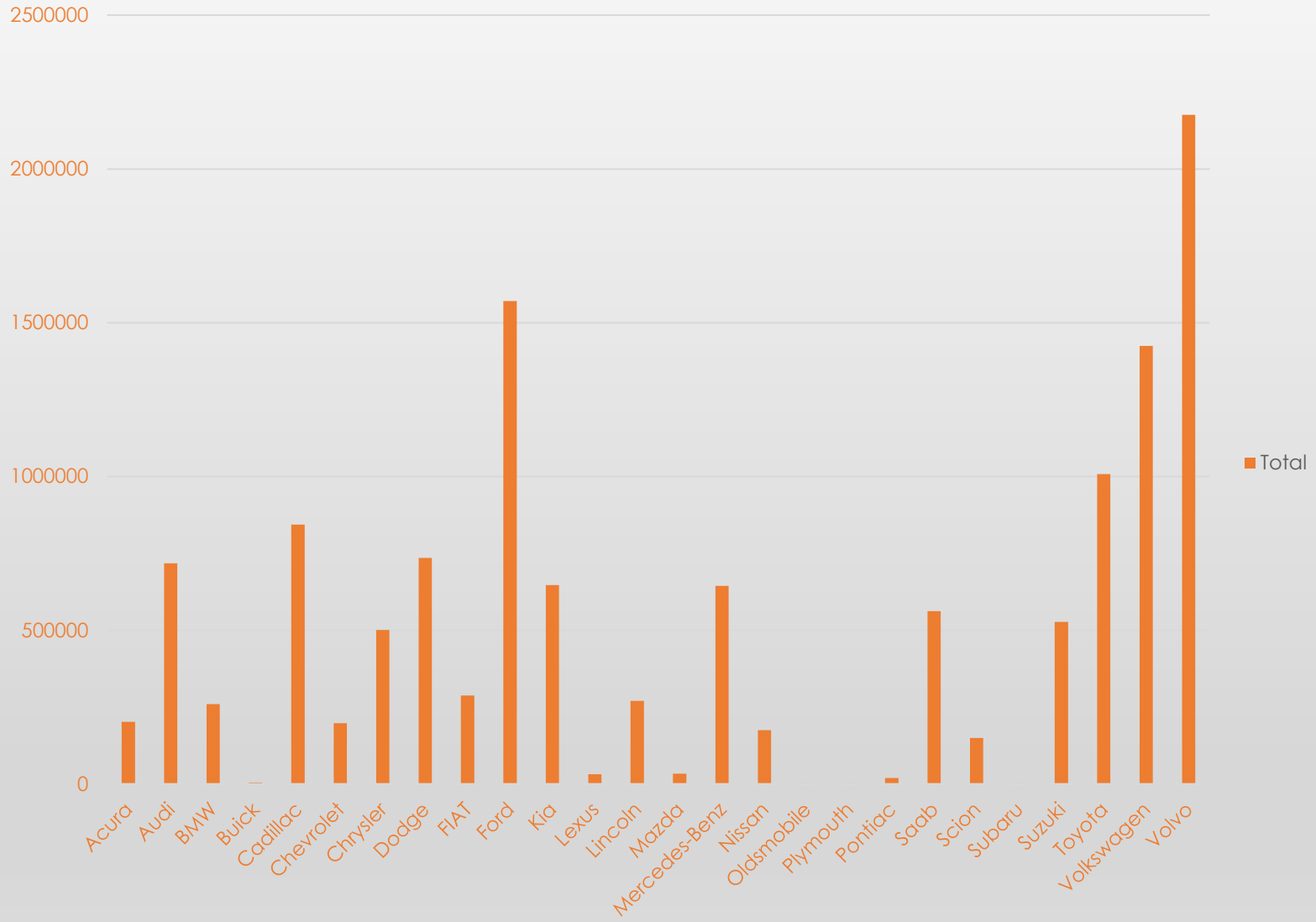


	Engine Cylinders	*highway MPG*
Engine Cylinders	1	
highway MPG	-0.621605733	1

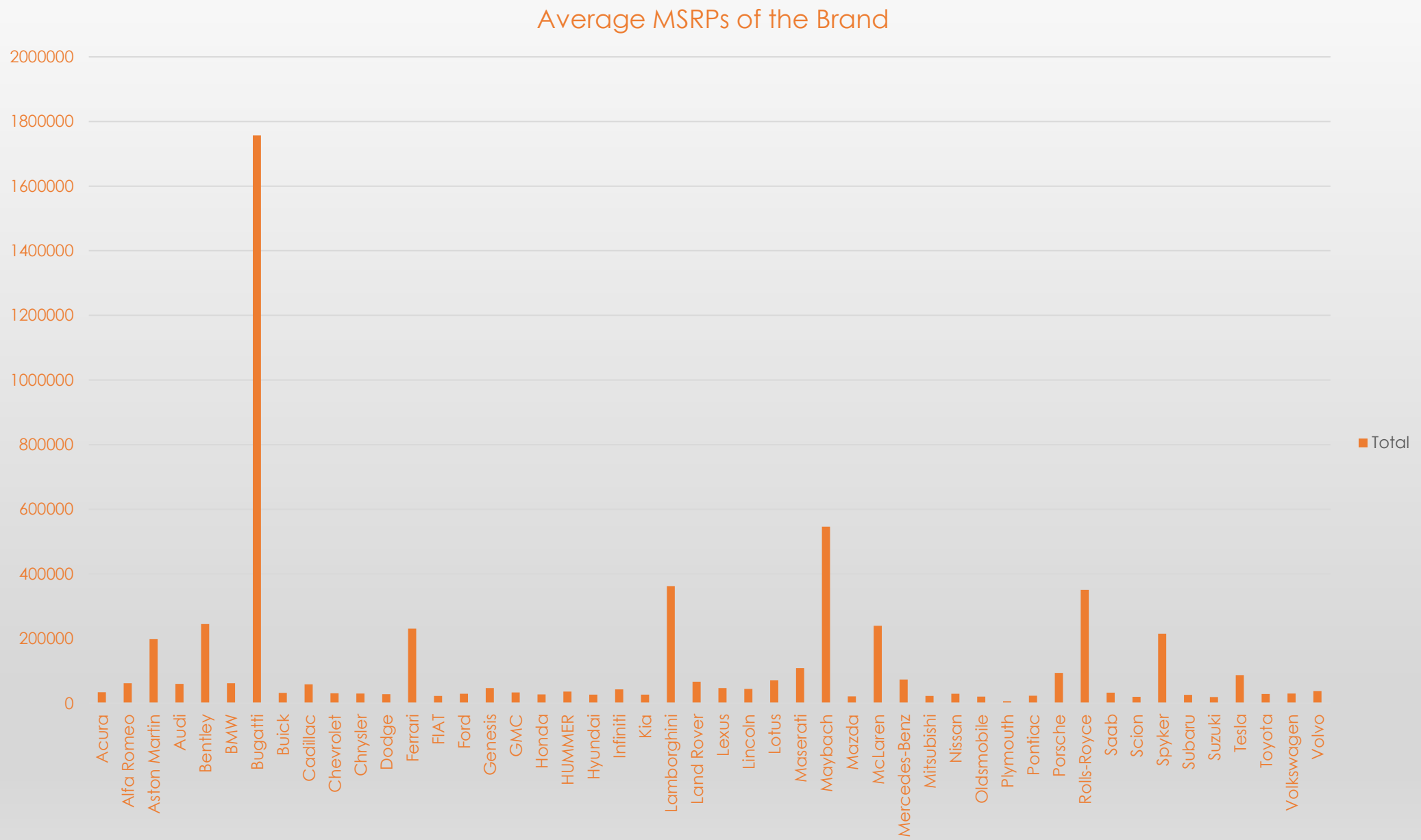
A. relationship between fuel efficiency and the number of cylinders in a car's engine



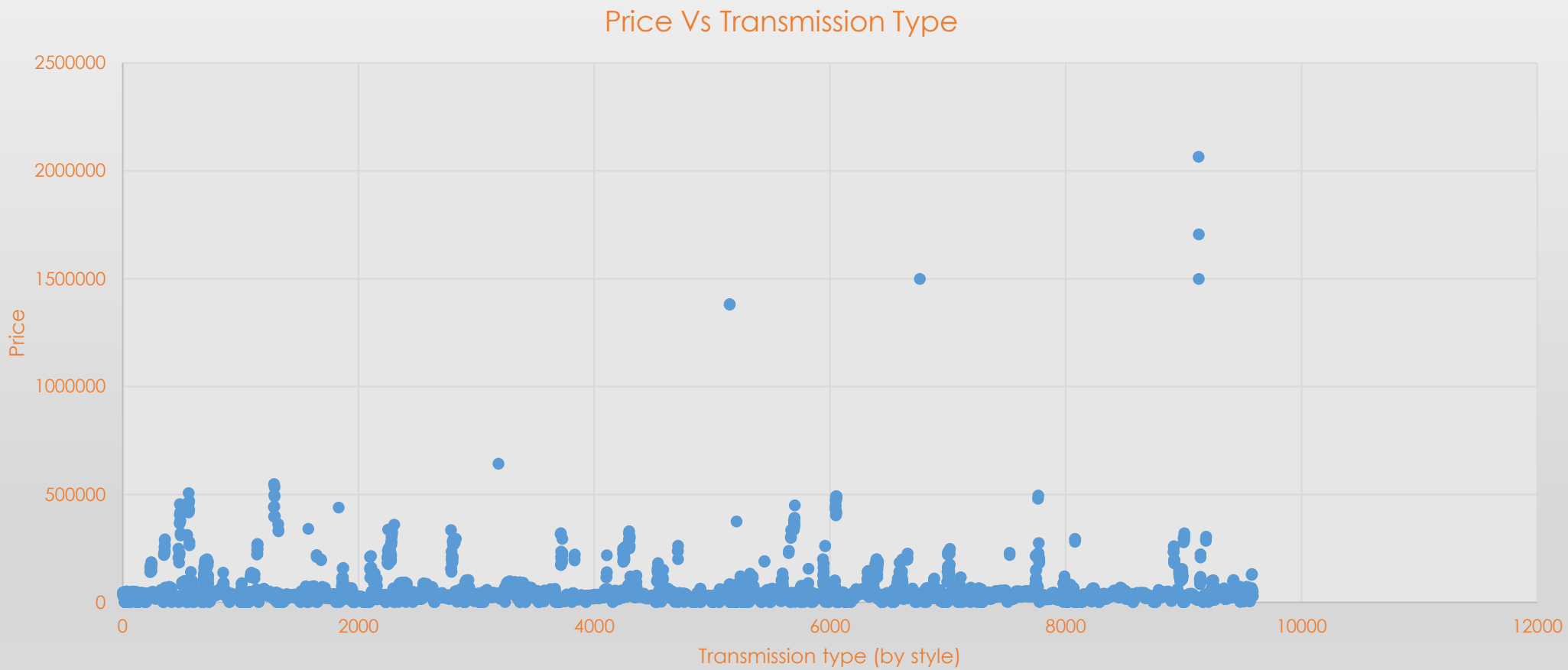
Car price distribution over brand and style



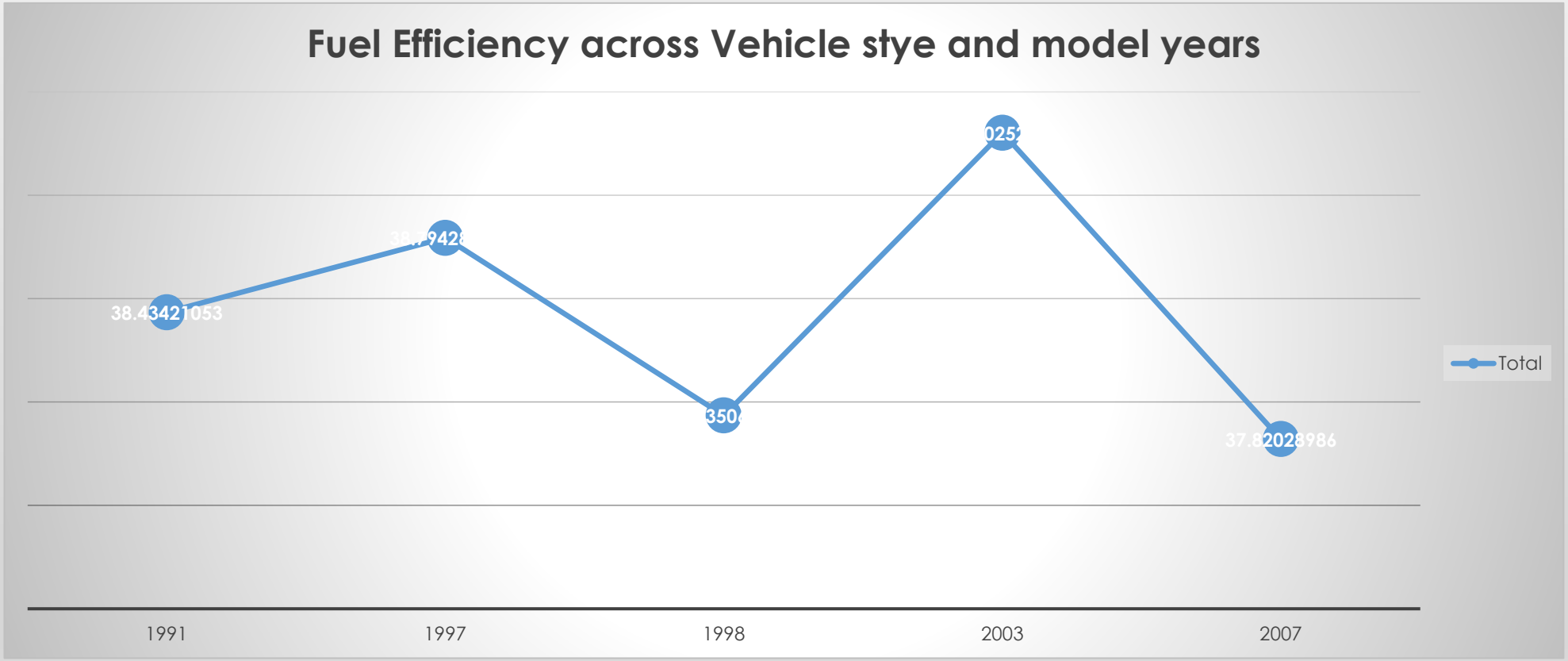
Vehicle Style	All
Row Labels	Average of MSRP
Acura	33860.71905
Alfa Romeo	61600
Aston Martin	198278.6782
Audi	59781.84351
Bentley	244750.4918
BMW	61832.61888
Bugatti	1757223.667
Buick	31660.87037
Cadillac	58291.66565
Chevrolet	30573.81972
Chrysler	29617.92357
Dodge	27783.51613
Ferrari	230642.9636
FIAT	22209.36364
Ford	29403.52909
Genesis	46616.66667
GMC	33452.46004
Honda	27008.27512
HUMMER	36320
Hyundai	26610.27979
Infiniti	43044.12268
Kia	26257.15
Lamborghini	362063.2353
Land Rover	66402.25
Lexus	46555.45055
Lincoln	44043.64122
Lotus	70693.47826
Maserati	108460.3696
Maybach	546221.875
Mazda	20901.26163
McLaren	239805
Mercedes-Benz	73603.61059
Mitsubishi	22311.96795
Nissan	28920.06264
Oldsmobile	20351.03846
Plymouth	6384.666667
Pontiac	23296.87838
Porsche	93641.59615
Rolls-Royce	351130.6452
Saab	32908.92958
Scion	19975.09259
Spyker	214990
Subaru	25968.02604
Suzuki	19252.35688
Tesla	86856.25
Toyota	28397.42105
Volkswagen	30019.24048
Volvo	37585.22162
Grand Total	**43562.9346**

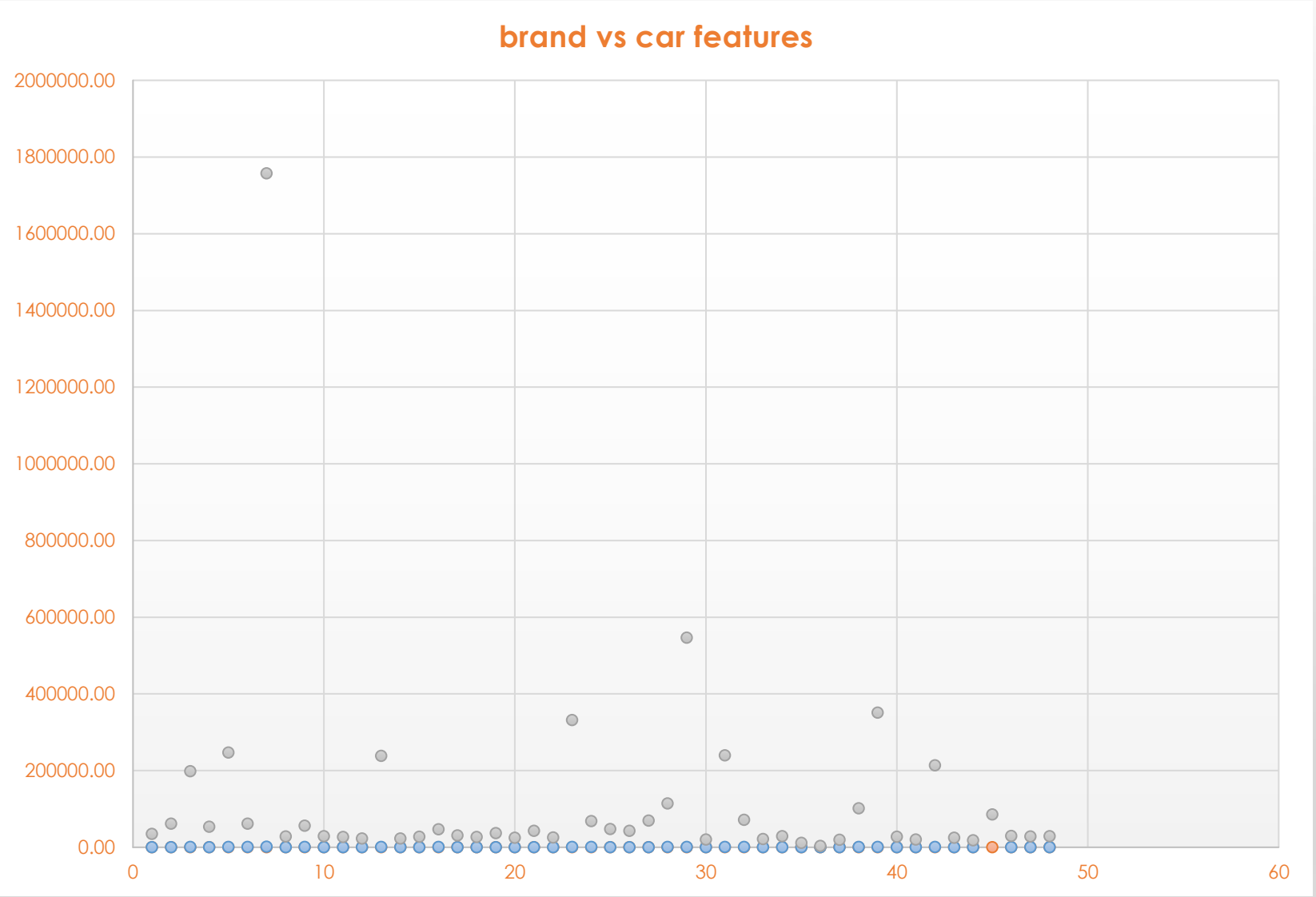

Average MSRPs of the Brand
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Acura
Alfa Romeo
Aston Martin
Audi
Bentley
BMW
Bugatti
Buick
Cadillac
Chevrolet
Chrysler
Dodge
Ferrari
FIAT
Ford
Genesis
GMC
Honda
HUMMER
Hyundai
Infiniti
Kia
Lamborghini
Land Rover
Lexus
Lincoln
Lotus
Maserati
Maybach
Mazda
McLaren
Mercedes-Benz
Mitsubishi
Nissan
Oldsmobile
Plymouth
Pontiac
Porsche
Rolls-Royce
Saab
Scion
Spyker
Subaru
Suzuki
Tesla
Toyota
Volkswagen
Volvo
Total

Vehicle Style	All					
	Transmission Type					
	AUTOMATED_MANUAL	AUTOMATIC	DIRECT_DRIVE	MANUAL	UNKNOWN	Grand Total
Average of MSRP	**103253.4085**	**42867.18**	**49296.98113**	**31395.1928**	**3647.83333**	**43501.1353**



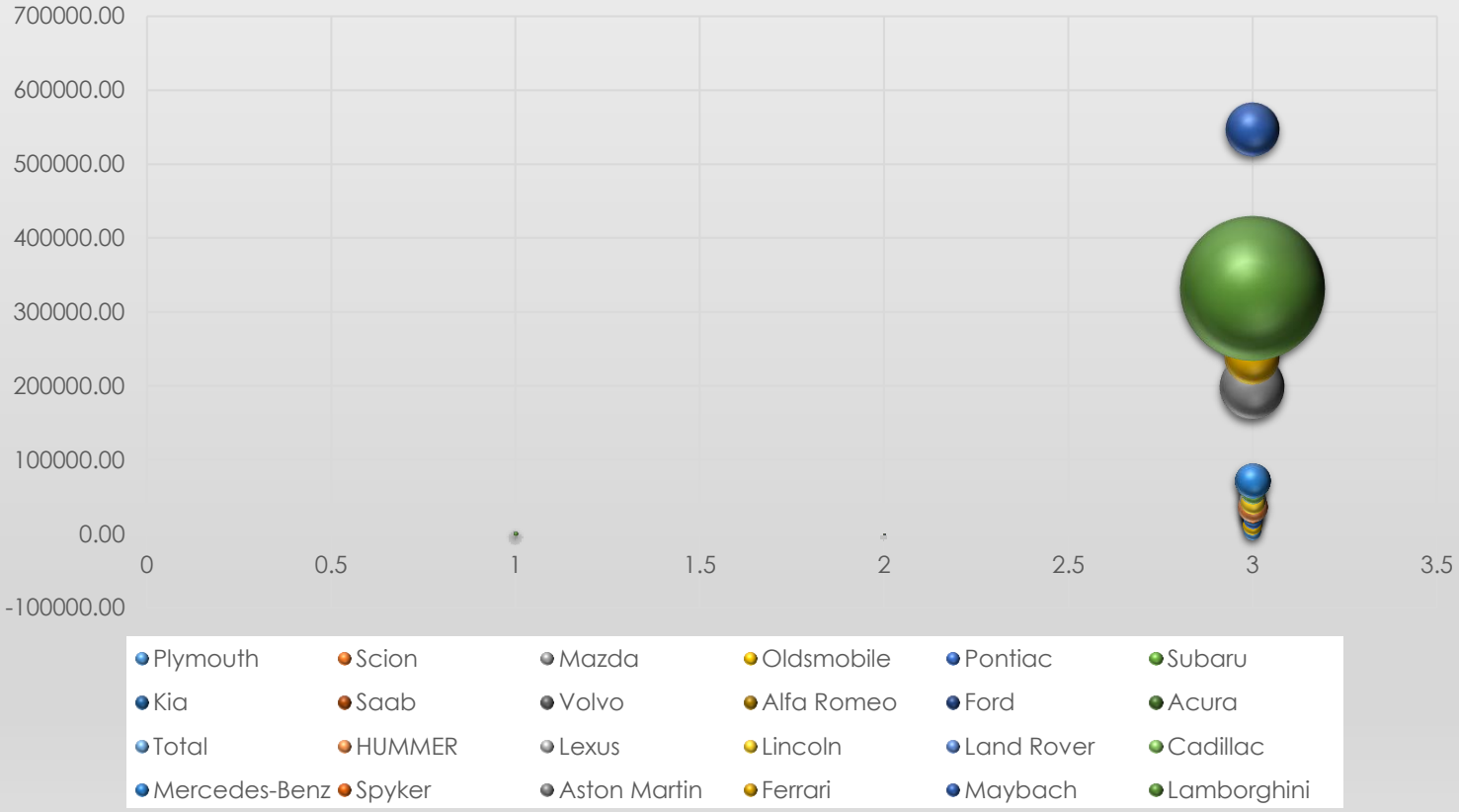
Vehicle Style	All
Row Labels	Average of Total MPG
1991	38.43421053
1997	38.79428571
1998	37.93506494
2003	39.30252101
2007	37.82028986
Grand Total	**38.41635338**





Row Labels	Average of Engine H	Average of Total MPI	Average of MSR
Acura	244.80	48.05	34887.59
Alfa Romeo	237.00	58.00	61600.00
Aston Martin	484.32	31.42	197910.38
Audi	277.70	48.41	53452.11
Bentley	533.85	30.46	247169.32
BMW	326.91	49.99	61546.76
Bugatti	1001.00	22.00	1757223.67
Buick	219.24	45.65	28206.61
Cadillac	332.31	42.59	56231.32
Chevrolet	246.97	44.84	28350.39
Chrysler	229.14	44.13	26722.96
Dodge	244.42	38.41	22390.06
Ferrari	511.96	26.29	238218.84
FIAT	143.56	67.98	22670.24
Ford	243.10	41.97	27399.27
Genesis	347.33	41.67	46616.67
GMC	259.84	37.22	30493.30
Honda	195.75	58.02	26674.34
HUMMER	261.24	30.82	36464.41
Hyundai	201.92	52.74	24597.04
Infiniti	310.07	42.61	42394.21
Kia	206.83	54.50	25310.17
Lamborghini	614.08	29.54	331567.31
Land Rover	322.10	38.36	67823.22
Lexus	277.42	46.19	47549.07
Lincoln	284.91	42.38	42839.83
Lotus	275.97	45.31	69188.28
Maserati	420.79	33.62	114207.71
Maybach	590.50	26.00	546221.88
Mazda	171.99	49.10	
McLaren	610.40	37.80	
Mercedes-Ber	350.18	43.01	
Mitsubishi	173.43	49.46	21240.54
Nissan	239.92	49.67	28583.43
Oldsmobile	177.47	43.84	11542.54
Plymouth	131.56	48.76	3122.90
Pontiac	190.30	45.75	19321.55
Porsche	392.79	42.84	101622.40
Rolls-Royce	487.55	30.97	351130.65
Saab	220.52	44.12	27413.50
Scion	154.43	57.62	19932.50
Spyker	400.00	31.00	213323.33
Subaru	197.31	50.47	24827.50
Suzuki	160.29	45.95	17907.21
Tesla		193.06	85255.56
Toyota	236.15	48.01	29030.02
Volkswagen	189.76	55.71	28102.38
Volvo	230.97	46.79	28541.16
Grand Total	**249.39**	**46.37**	**40594.74**

It shows that certain car brands such as Bugatti tend to have higher horsepower and higher prices, while others may have lower horsepower and lower prices such as Plymouth. The chart can be useful in identifying trends and making comparisons between different car brands



Bran	Average of Engi	Average of Total	Average of M
Plymouth	131.56	48.76	3122.90
FIAT	143.56	67.38	22670.24
Scion	154.43	57.62	13932.50
Suzuki	160.29	45.95	17907.21
Mazda	171.99	49.10	20039.38
Mitsubis	173.43	49.46	21240.54
Oldsmob	177.47	43.84	11542.54
Volkswa	189.76	55.71	28102.38
Pontiac	190.30	45.75	19321.55
Honda	195.75	58.02	26674.34
Subaru	197.31	50.47	24827.50
Hyundai	201.92	52.74	24597.04
Kia	206.83	54.50	25310.17
Buick	219.24	45.65	28206.61
Saab	220.52	44.12	27413.50
Chrysler	223.14	44.13	26722.96
Volvo	230.37	46.79	28541.16
Toyota	236.15	48.01	29030.02
Alfa Rom	237.00	58.00	61600.00
Nissan	239.92	49.67	28583.43
Ford	243.10	41.97	27399.27
Dodge	244.42	38.41	22390.06
Acura	244.80	48.05	34887.59
Chevrole	246.97	44.84	28350.39
Total	249.39	46.37	40594.74
GMC	259.84	37.22	30493.30
HUMME	261.24	30.82	36464.41
Lotus	275.97	45.31	69188.28
Lexus	277.42	46.19	47549.07
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BMW	326.91	49.99	61546.76
Cadillac	332.31	42.59	56231.32
Genesis	347.33	41.67	46616.67
Mercede	350.18	43.01	71476.23
Porsche	392.79	42.84	101622.40
Spyker	400.00	31.00	213323.33
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Maybach	590.50	26.00	546221.88
McLaren	610.40	37.80	239805.00
Lamborg	614.06	29.54	331567.31
Bugatti	1001.00	22.00	1757223.67
Tesla		193.06	85255.56

Result-

-The insights gained from the analysis provide valuable information for car manufacturers to make informed decisions regarding pricing, product development, marketing, and competitiveness in the market. By optimizing these factors, manufacturers can maximize profitability while meeting consumer demand.

-The interactive dashboard created in Excel allows stakeholders to explore various aspects of the dataset. They can visualize the distribution of car prices by brand and body style, compare average MSRPs across different brands and body styles, analyze the impact of transmission type on MSRP by body style, observe the trend of fuel efficiency across different body styles and model years, and understand the relationships between horsepower, MPG, and price across different car brands.

Hyperlink of project : link

thank you.!!