Analysing the Impact of Car Features on Price and Profitability

Final project -3

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PROJECT DESCRIPTION:

- This project aims to provide valuable insights and actionable information to stakeholders in the automotive industry, enabling them to make informed decisions related to pricing strategies, feature enhancements, and fuel efficiency improvements.
- The dataset contains information on over 11,000 car models and their specifications, including details on the car's make, model, year, fuel type, engine power, transmission, wheels, number of doors, market category, size, style, estimated miles per gallon, popularity, and manufacturer's suggested retail price (MSRP).
- This project focuses on conducting exploratory analysis of a car dataset to uncover insights and answer important business questions in the automotive industry. The dataset comprises a wide range of information, including car make, model, year, engine specifications, transmission type, fuel efficiency, pricing, and more. The primary objective is to gain a deeper understanding of various factors that influence car pricing and fuel efficiency. By analyzing the dataset, we aim to identify patterns, trends, and correlations among different car features and their impact on pricing and fuel efficiency.
- We also investigate the distribution of car prices across different brands and body styles to understand how pricing varies within these categories. Furthermore, we explore the relationship between transmission type and body style with the car's suggested retail price (MSRP) to examine their impact on pricing and analyzing how fuel efficiency varies across different body styles and model years. And finally examine the relationship between car brands and the car's horsepower, MPG, and price.

Approach:

- Our project utilized descriptive statistics, visualization techniques, and modeling to analyze the car dataset and address the business questions.
- We employed descriptive statistics to summarize the data and gain insights into various car attributes.
- Visualization techniques such as pivot tables, charts, and plots were used to represent the data visually and identify patterns and trends.
- Regression analysis was performed to identify the key variables affecting car prices.

Tech-Stack Used

- Excel Workbook
- Power Point

Link to excel working file

INSIGHTS

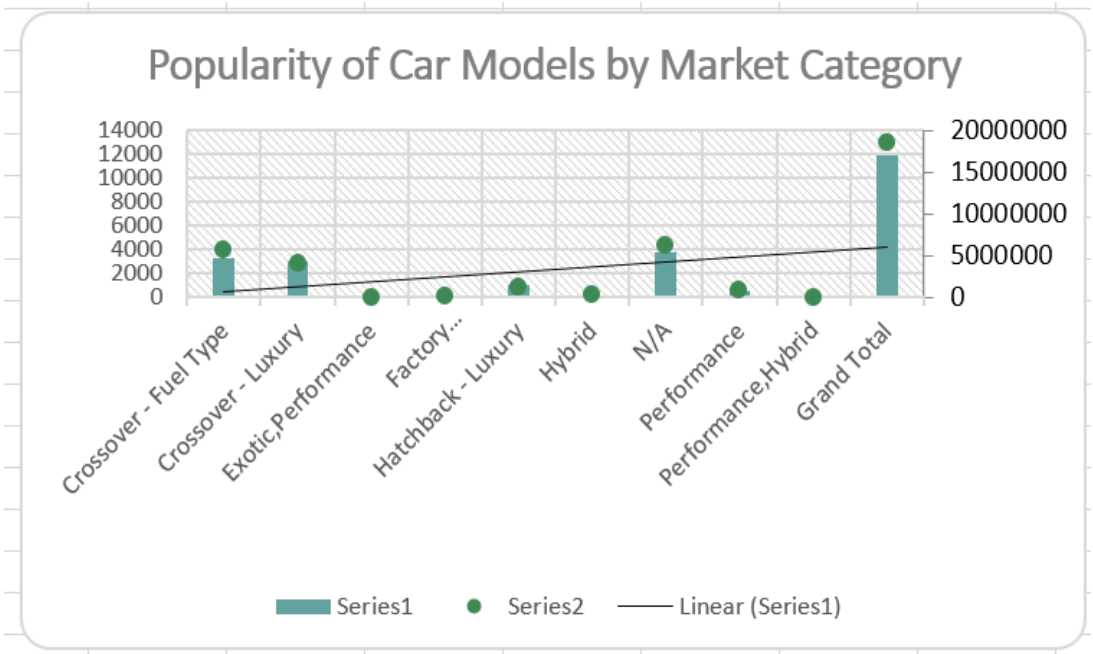
Tasks and Dashboards

1: How does the popularity of a car model vary across different market categories?

→ *Crossover-Fuel type has the most Car Models and is very popular.*

→ *'Factory Tuner, Performance' ,'hybrid', 'Exotic-Performance' are the Market Categories which needs Improvement.*

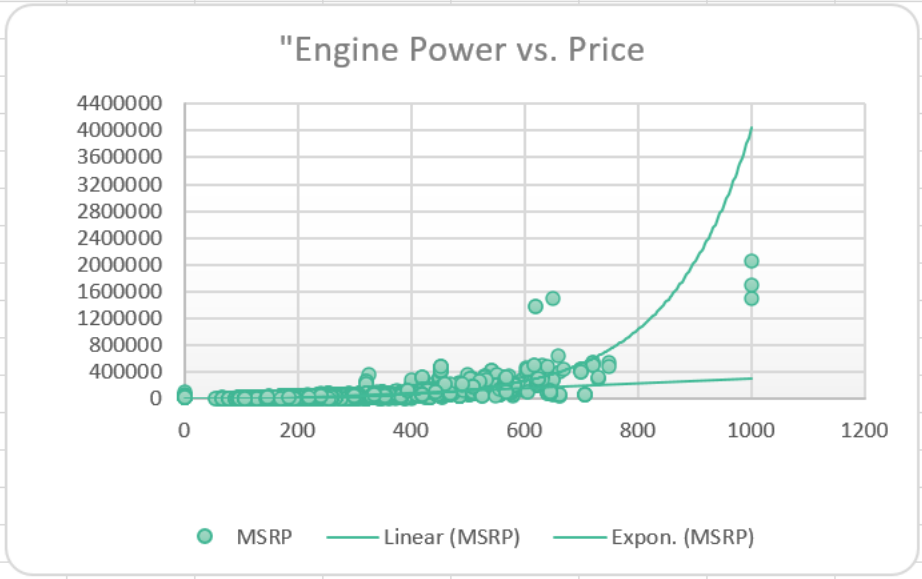
Row Labels	Car Model	Popularity.
Crossover - Fuel Type	3294	5617117
Crossover - Luxury	3064	4085835
Exotic,Performance	10	13910
Factory Tuner,Performance	92	156004
Hatchback - Luxury	987	1307613
Hybrid	123	258985
N/A	3742	6274920
Performance	601	810673
Performance,Hybrid	1	155
Grand Total	11914	18525212



2: What is the relationship between a car's engine power and its price?

- *The trendline is providing the insight that there is a positive correlation between engine power and price and the degree to which they are related.*
- *As engine horsepower increases, there is a tendency for the car price to increase as well.*

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
230	31500
320	48250
320	43550
172	2000

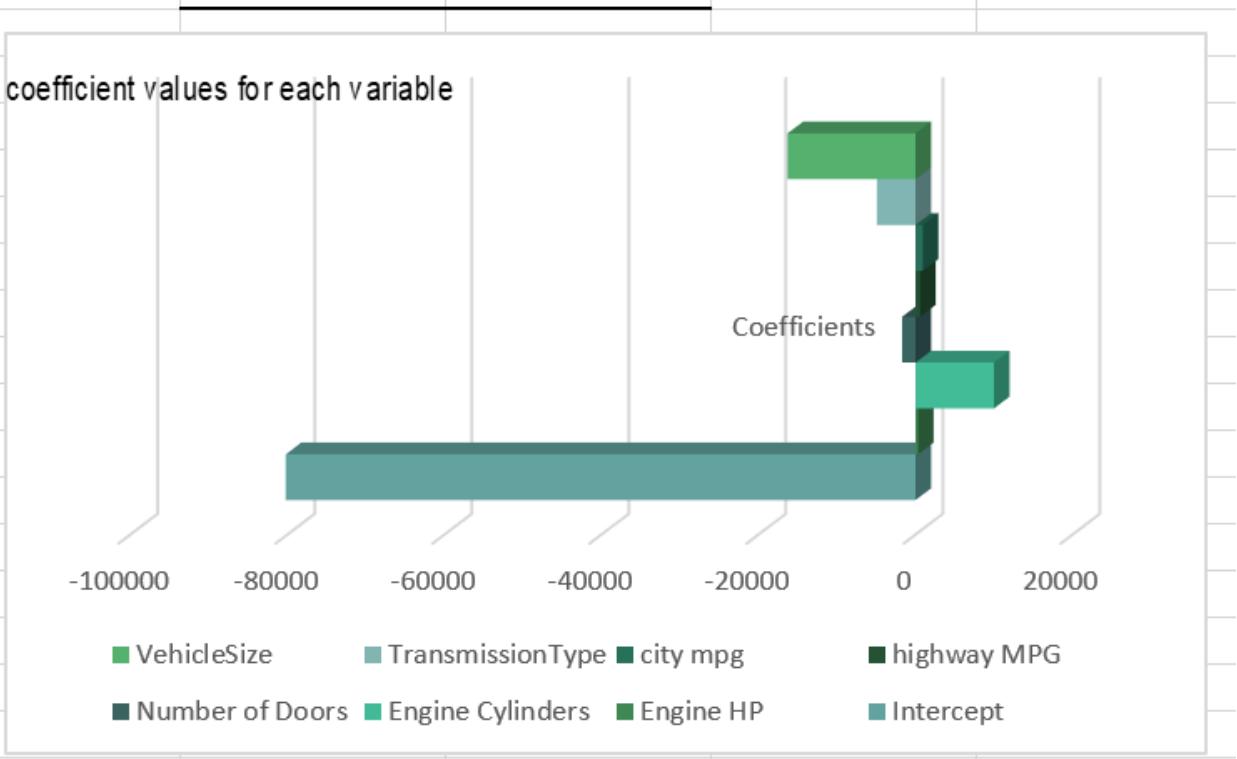


3: Which car features are most important in determining a car's price?

- *Regression analysis allows us to analyze the relationship between car price and car features. By analyzing the coefficient values obtained from the regression analysis, we can assess the impact of each variable on the car's price.*

Regression Statistics	
Multiple R	0.70259232
R Square	0.493635968
Adjusted R Squar	0.493335761
Standard Error	42905.73304
Observations	11815

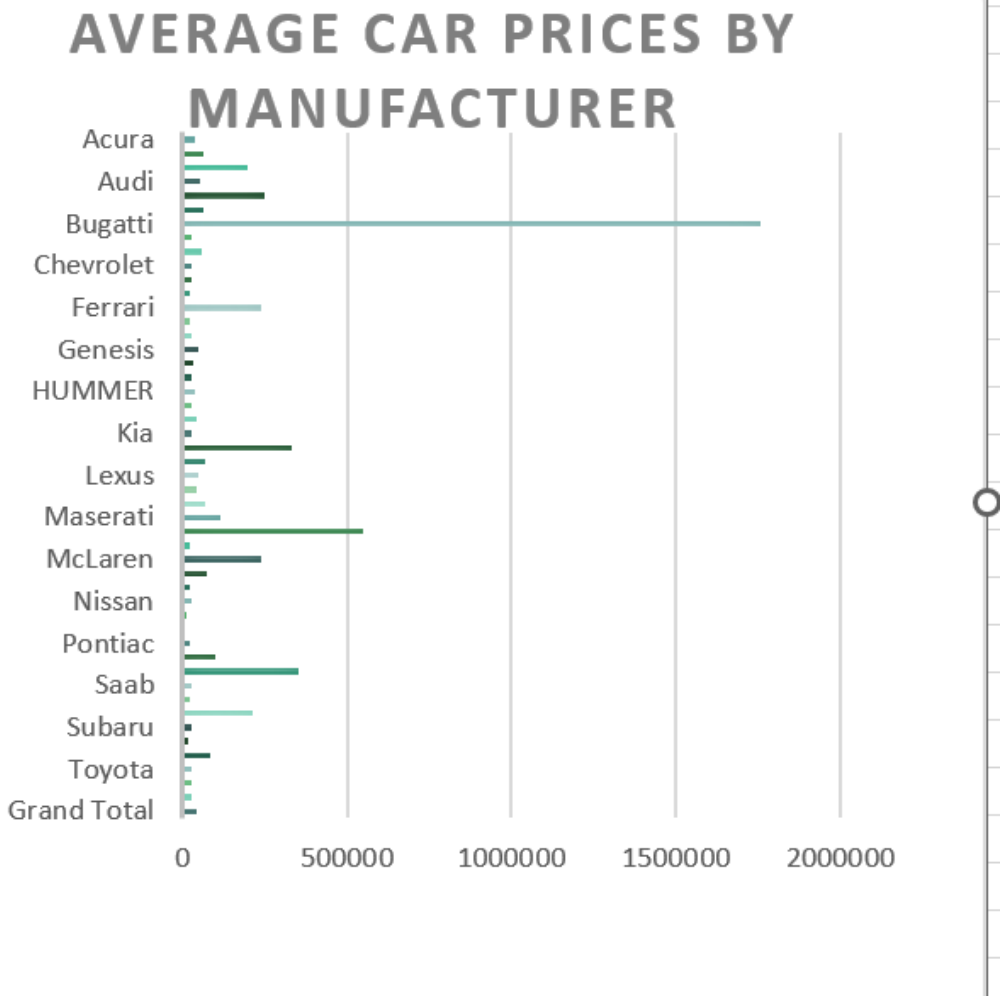
Column	*Coefficients*
Intercept	-80211.47439
Engine HP	317.1558874
Engine Cylinders	9991.895197
Number of Doors	-1697.659809
highway MPG	566.4363797
city mpg	934.8297412
TransmissionTyp	-4920.810654
VehicleSize	-16308.65866



4: How does the average price of a car vary across different manufacturers?

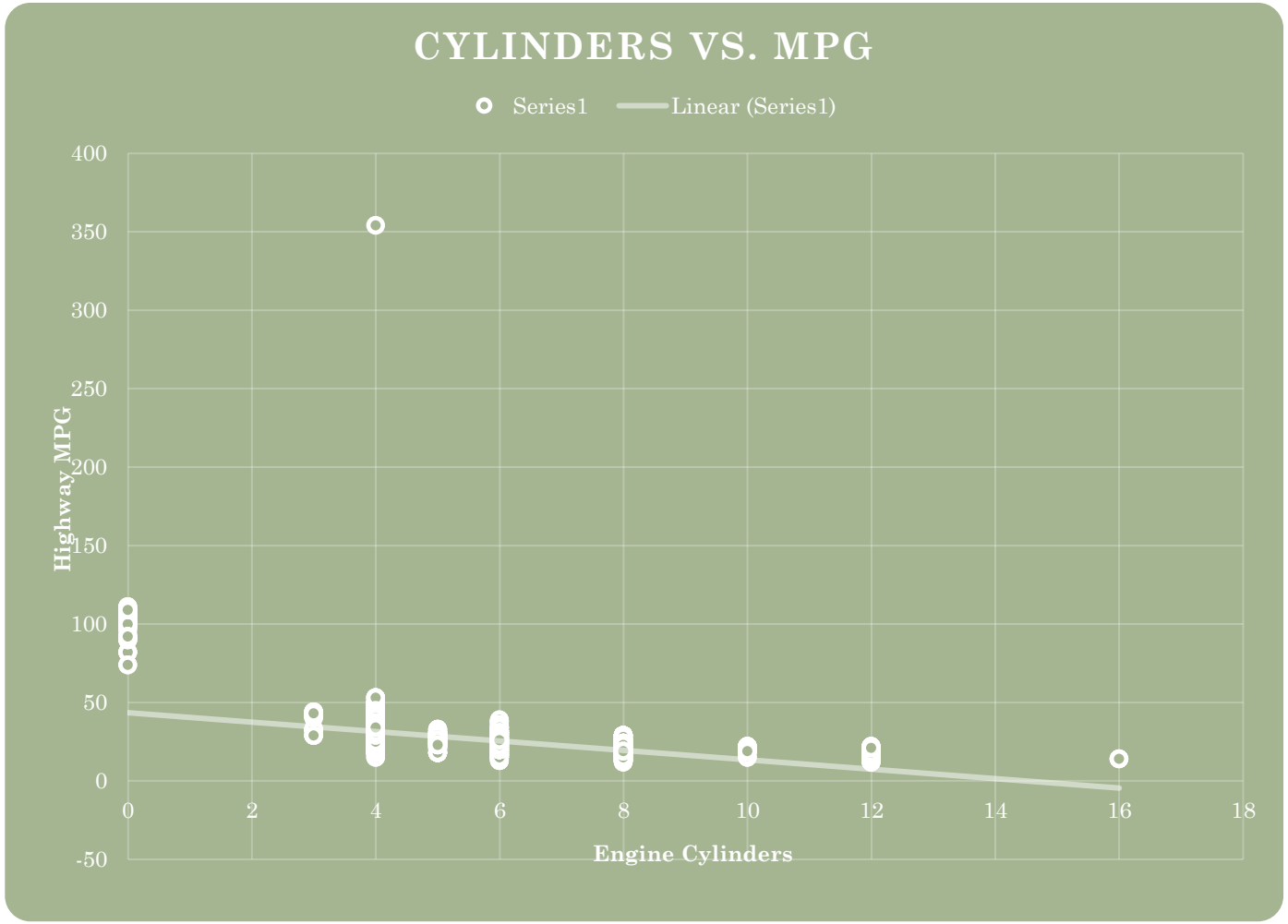
- *The results revealed a wide range of average prices, with luxury brands like Maserati and Bugatti commanding higher prices compared to mainstream brands like Hyundai and Toyota.*

Row Labels	Avg MSRP
Acura	34887.5873
Alfa Romeo	61600
Aston Martin	197910.3763
Audi	53452.1128
Bentley	247169.3243
BMW	61546.76347
Bugatti	1757223.667
Buick	28206.61224
Cadillac	56231.31738
Chevrolet	28350.38557
Chrysler	26722.96257
Dodge	22390.05911
Ferrari	238218.8406
FIAT	22670.24194
Ford	27399.26674
Genesis	46616.66667
GMC	30493.29903
Honda	26674.34076
HUMMER	36464.41176
Hyundai	24597.0363

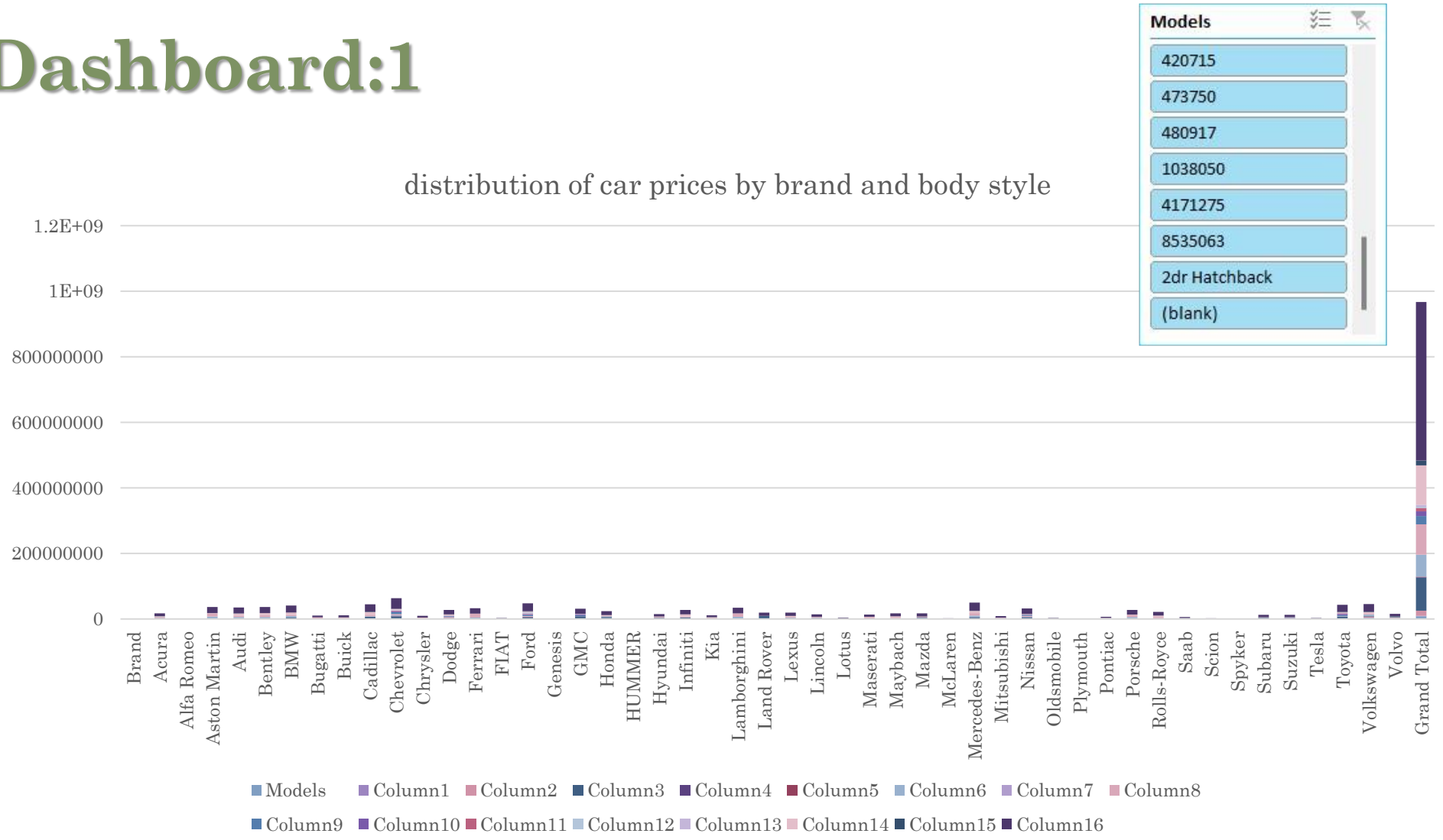


5: What is the relationship between fuel efficiency and the number of cylinders in a car's engine?

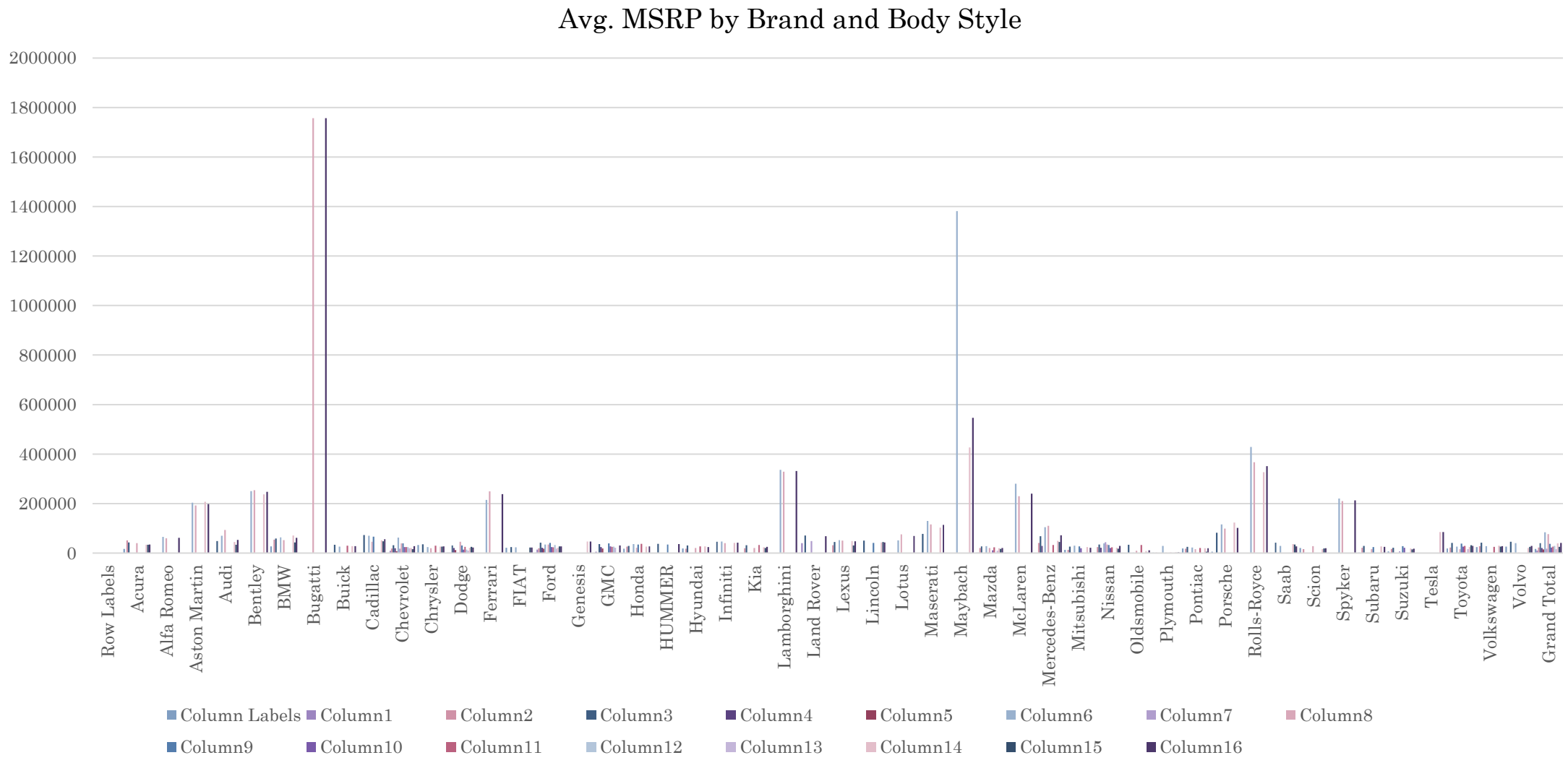
- *there is a negative relationship between the number of cylinders in a car's engine and its fuel efficiency, as represented by highway MPG. As the number of cylinders decreases, the car tends to have lower fuel efficiency.*
- *The correlation coefficient measures the degree of linear association between two variables. the correlation coefficient was found to be -0.62 . =CORREL(Table_4[Engine Cylinders],Table_4[highway MPG])*



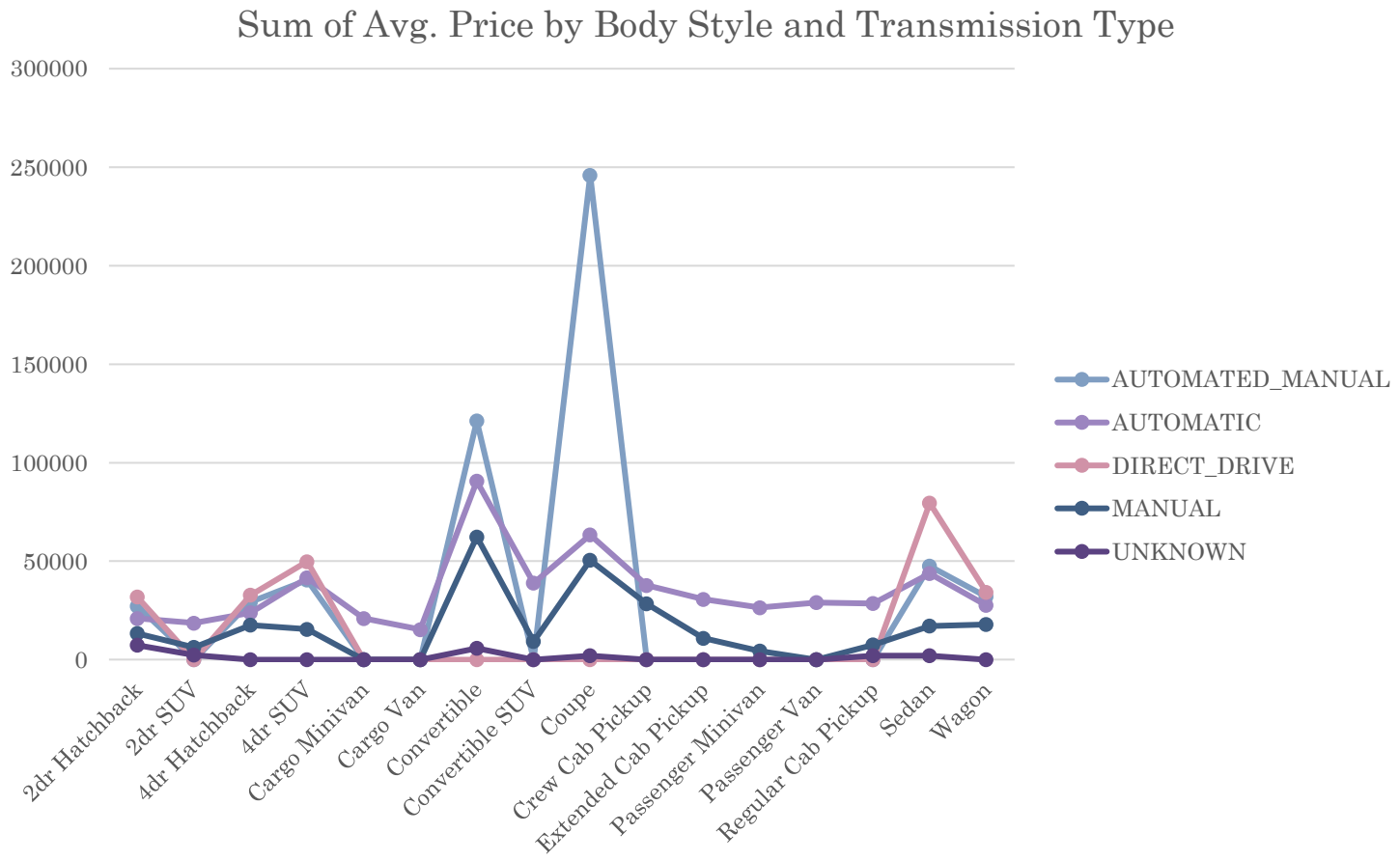
Dashboard:1

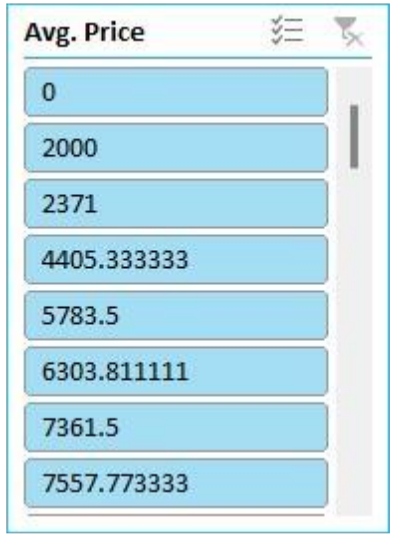

Models
420715
473750
480917
1038050
4171275
8535063
2dr Hatchback
(blank)
distribution of car prices by brand and body style
1.2E+09
1E+09
800000000
600000000
400000000
200000000
0
Brand
Acura
Alfa Romeo
Aston Martin
Audi
Bentley
BMW
Bugatti
Buick
Cadillac
Chevrolet
Chrysler
Dodge
Ferrari
FIAT
Ford
Genesis
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
Grand Total
Models
Column1
Column2
Column3
Column4
Column5
Column6
Column7
Column8
Column9
Column10
Column11
Column12
Column13
Column14
Column15
Column16

Dashboard:2

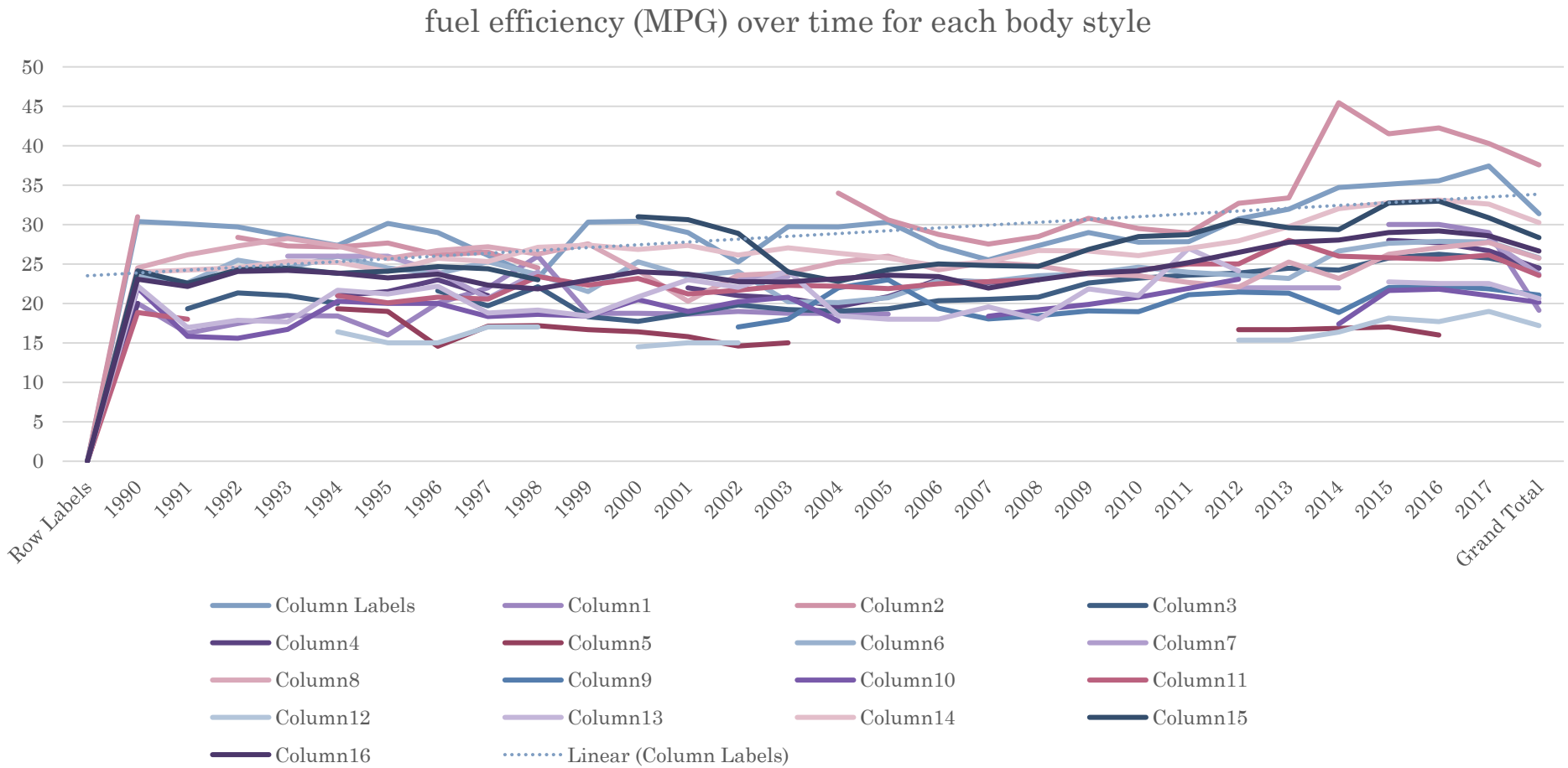

Avg. MSRP by Brand and Body Style
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Row Labels
Acura
Alfa Romeo
Aston Martin
Audi
Bentley
BMW
Bugatti
Buick
Cadillac
Chevrolet
Chrysler
Dodge
Ferrari
FIAT
Ford
Genesis
GMC
Honda
HUMMER
Hyundai
Infiniti
Kia
Lamborghini
Land Rover
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
Grand Total
Column Labels
Column1
Column2
Column3
Column4
Column5
Column6
Column7
Column8
Column9
Column10
Column11
Column12
Column13
Column14
Column15
Column16

Dashboard:3

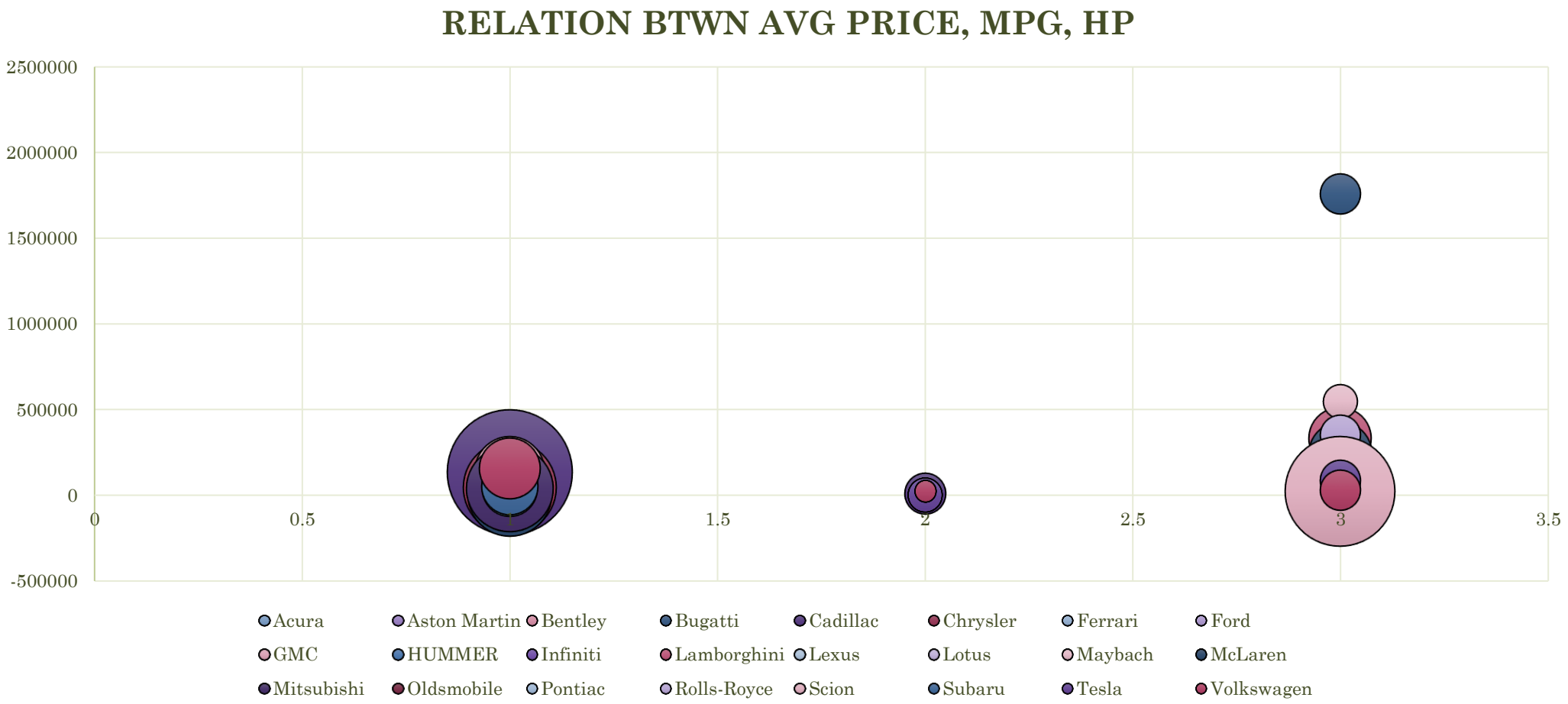

Sum of Avg. Price by Body Style and Transmission Type
300000
250000
200000
150000
100000
50000
0
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pickup
Passenger Minivan
Passenger Van
Regular Cab Pickup
Sedan
Wagon
AUTOMATED_MANUAL
AUTOMATIC
DIRECT_DRIVE
MANUAL
UNKNOWN


Avg. Price
0
2000
2371
4405.333333
5783.5
6303.811111
7361.5
7557.773333

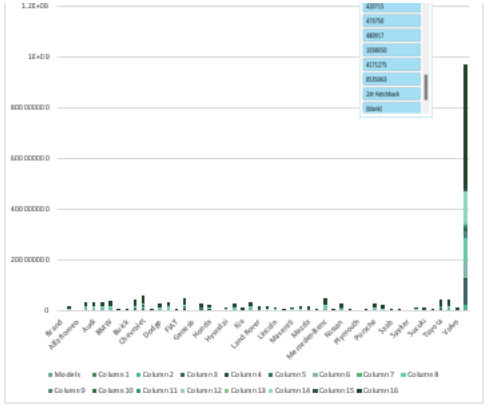
Dashboard:4

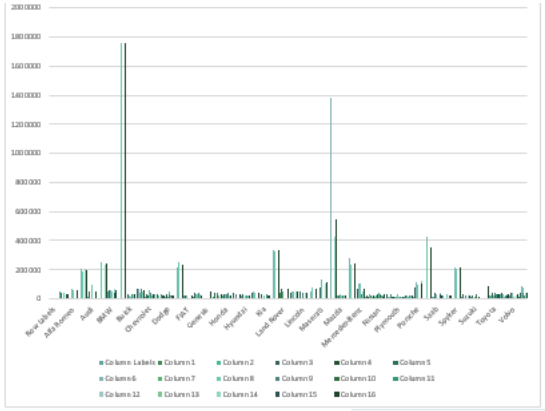

fuel efficiency (MPG) over time for each body style
50
45
40
35
30
25
20
15
10
5
0
Row Labels
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Grand Total
Column Labels
Column1
Column2
Column3
Column4
Column5
Column6
Column7
Column8
Column9
Column10
Column11
Column12
Column13
Column14
Column15
Column16
Linear (Column Labels)

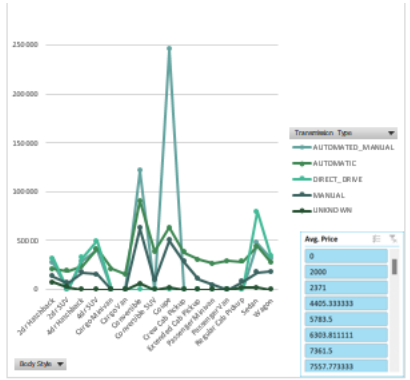
Dashboard:5

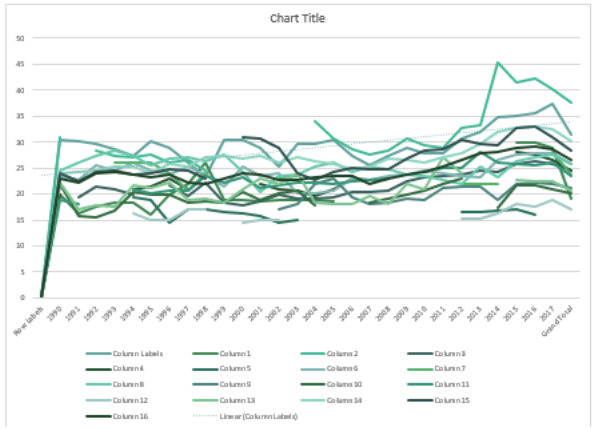

RELATION BTWN AVG PRICE, MPG, HP
2500000
2000000
1500000
1000000
500000
0
-500000
0
0.5
1
1.5
2
2.5
3
3.5
Acura
Aston Martin
Bentley
Bugatti
Cadillac
Chrysler
Ferrari
Ford
GMC
HUMMER
Infiniti
Lamborghini
Lexus
Lotus
Maybach
McLaren
Mitsubishi
Oldsmobile
Pontiac
Rolls-Royce
Scion
Subaru
Tesla
Volkswagen

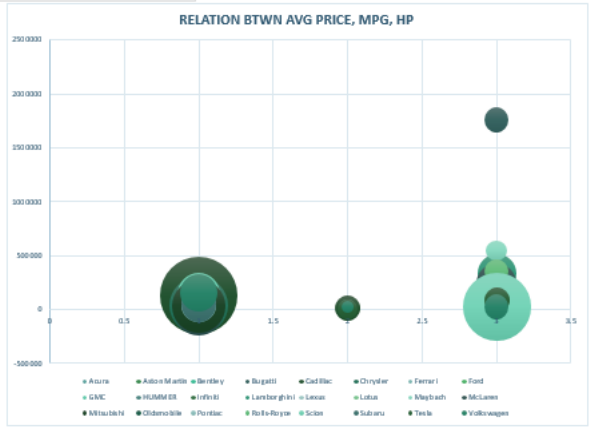
Final Dashboard











Results

- The given tasks Enlighted me about the business problem which requires 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 those questions and building an interactive dashboard, I'm able to provide valuable insights to a car manufacturer and help them optimize their pricing and product development decisions to maximize profitability while meeting consumer demand.

THANK YOU

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