

Analyzing the Impact of Car Features on Price and Profitability

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. 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 analysing 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.
- By using data analysis techniques such as regression analysis and market segmentation, the manufacturer could develop a pricing strategy that balances consumer demand with profitability, and identify which product features to focus on in future product development efforts
- 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.
- **Number of observations:** 11,915
- **Number of variables:** 16
- **File type:** CSV (Comma Separated Values)

APPROACH:

- To perform the project a systematic approach was followed. A dataset was downloaded. Microsoft Excel 2021 was selected as the primary tool for data analysis such as cleaning, deleting blank rows and due to its versatility and robust capabilities in handling tabular data. Specific techniques such as pivot tables, charts, visualizations and were employed to analyze the dataset and extract meaningful insights.

TECH-STACK USED:

- Software: Microsoft Excel 2021
- Purpose: Excel was chosen for its extensive data analysis functions, including pivot tables, charts, and statistical functions and visualization of the Car data

INSIGHTS: various key insights were uncovered through the data analytics process. Meaningful trends and visualization patterns were observed in the data

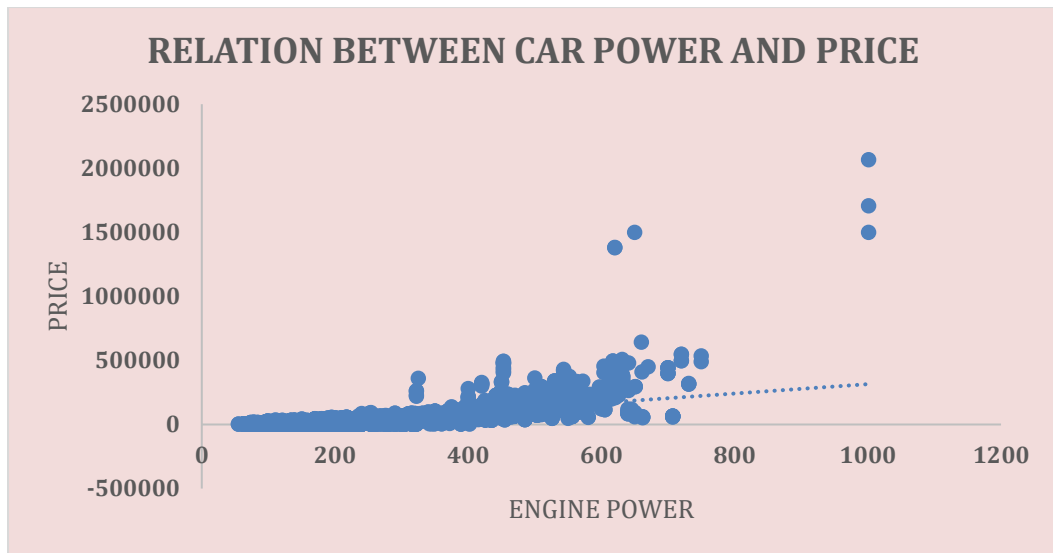
TASK ANALYSIS:

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.

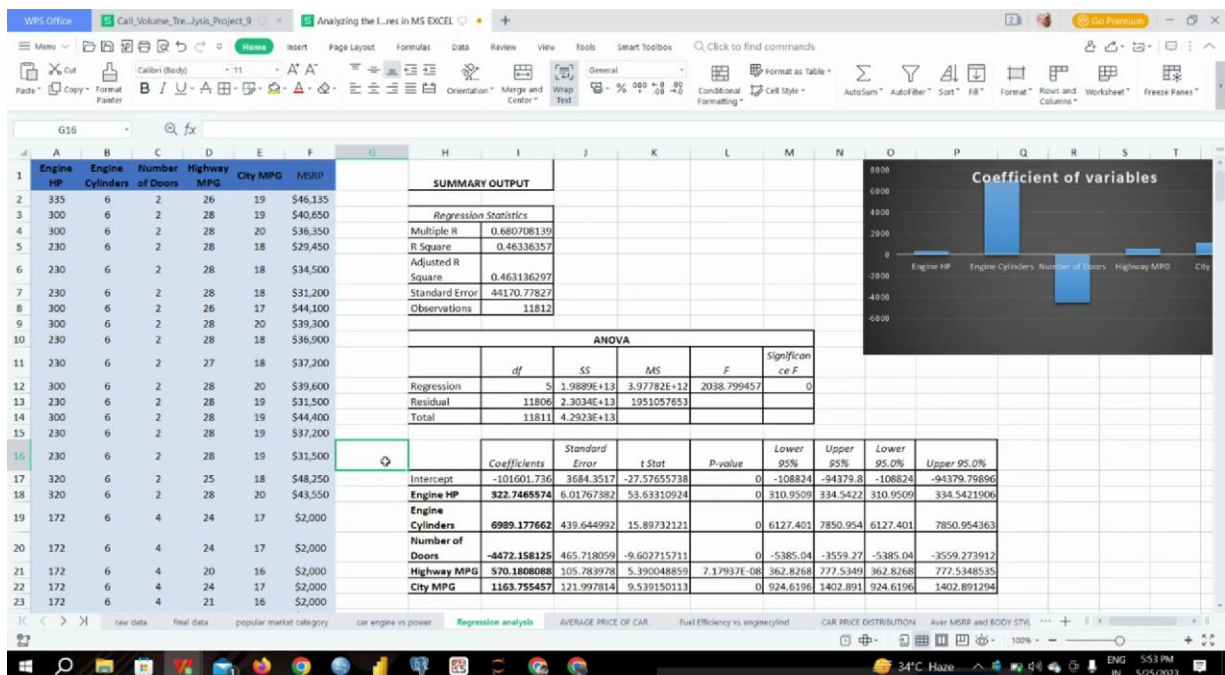
MARKET CATEGORY	Average of Popularity	Count of Model
Crossover	1529.03	1103
Crossover,Diesel	873.00	7
Crossover,Exotic,Luxury,High-Performance	238.00	1
Crossover,Exotic,Luxury,Performance	238.00	1
Crossover,Factory Tuner,Luxury,High-Performance	1823.46	26
Crossover,Factory Tuner,Luxury,Performance	2607.40	5
Crossover,Factory Tuner,Performance	210.00	4
Crossover,Flex Fuel	2073.75	64
Crossover,Flex Fuel,Luxury	1173.20	10
Crossover,Flex Fuel,Luxury,Performance	1624.00	6
Crossover,Flex Fuel,Performance	5657.00	6
Crossover,Hatchback	1675.69	72
Crossover,Hatchback,Factory Tuner,Performance	2009.00	6
Crossover,Hatchback,Luxury	204.00	7
Crossover,Hatchback,Performance	2009.00	6
Crossover,Hybrid	2563.38	42
Crossover,Luxury	884.55	410
Crossover,Luxury,Diesel	2195.85	33
Crossover,Luxury,High-Performance	1037.22	9
Crossover,Luxury,Hybrid	630.92	24
Crossover,Luxury,Performance	1344.85	113
Crossover,Luxury,Performance,Hybrid	3916.00	2
Crossover,Performance	2585.96	69
Diesel	1730.90	84
Diesel,Luxury	2275.00	51
Exotic,Factory Tuner,High-Performance	1046.38	21
Exotic,Factory Tuner,Luxury,High-Performance	517.54	52
Exotic,Factory Tuner,Luxury,Performance	520.00	3
Exotic,Flex Fuel,Factory Tuner,Luxury,High-Performance	520.00	13
Exotic,Flex Fuel,Luxury,High-Performance	520.00	11
Exotic,High-Performance	1261.57	252
Exotic,Luxury	112.67	12

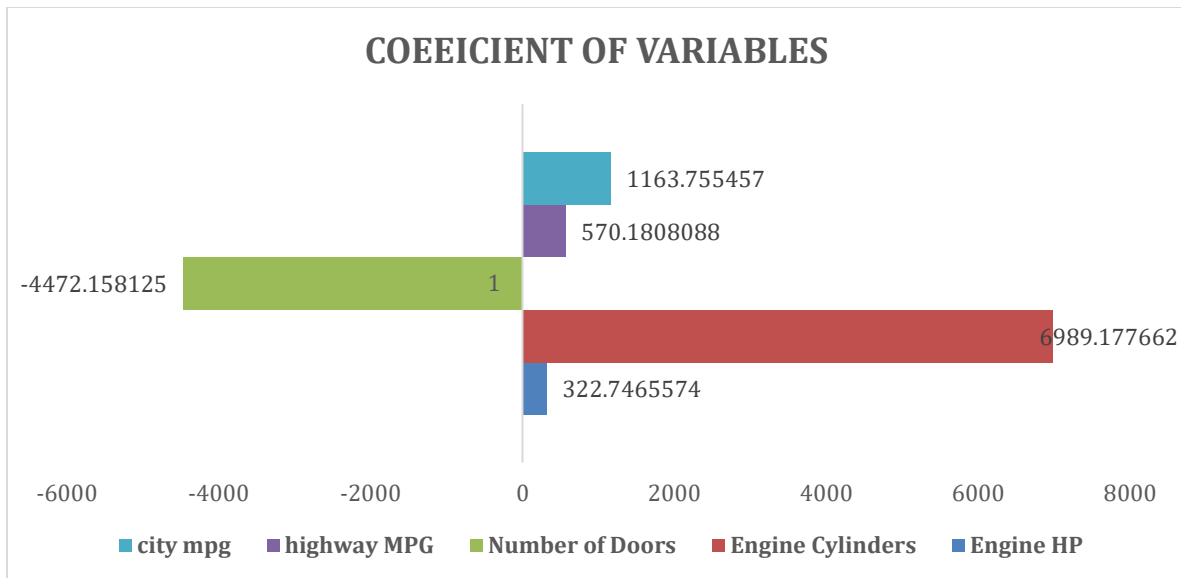
Exotic,Luxury,High-Performance	467.08	79
Exotic,Luxury,High-Performance,Hybrid	204.00	1
Exotic,Luxury,Performance	217.03	36
Factory Tuner,High-Performance	1941.42	106
Factory Tuner,Luxury	617.00	2
Factory Tuner,Luxury,High-Performance	2133.37	215
Factory Tuner,Luxury,Performance	1413.42	31
Factory Tuner,Performance	1733.10	89
Flex Fuel	2217.30	872
Flex Fuel,Diesel	5657.00	16
Flex Fuel,Factory Tuner,Luxury,High-Performance	258.00	1
Flex Fuel,Hybrid	155.00	2
Flex Fuel,Luxury	746.54	39
Flex Fuel,Luxury,High-Performance	878.91	33
Flex Fuel,Luxury,Performance	1380.07	28
Flex Fuel,Performance	1702.36	81
Flex Fuel,Performance,Hybrid	155.00	2
Hatchback	1293.00	614
Hatchback,Diesel	873.00	14
Hatchback,Factory Tuner,High-Performance	1205.15	13
Hatchback,Factory Tuner,Luxury,Performance	886.89	9
Hatchback,Factory Tuner,Performance	2159.05	22
Hatchback,Flex Fuel	5657.00	7
Hatchback,Hybrid	2121.25	72
Hatchback,Luxury	1379.50	46
Hatchback,Luxury,Hybrid	454.00	3
Hatchback,Luxury,Performance	1566.13	38
Hatchback,Performance	1039.65	252
High-Performance	1821.45	199
Hybrid	2105.57	123
Luxury	1107.55	851
Luxury,High-Performance	1668.02	334
Luxury,High-Performance,Hybrid	568.83	12
Luxury,Hybrid	724.69	48
Luxury,Performance	1292.62	673
Luxury,Performance,Hybrid	2333.18	11
Performance	1371.08	584
Performance,Hybrid	155.00	1
Grand Total	1499.397823	8084



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.



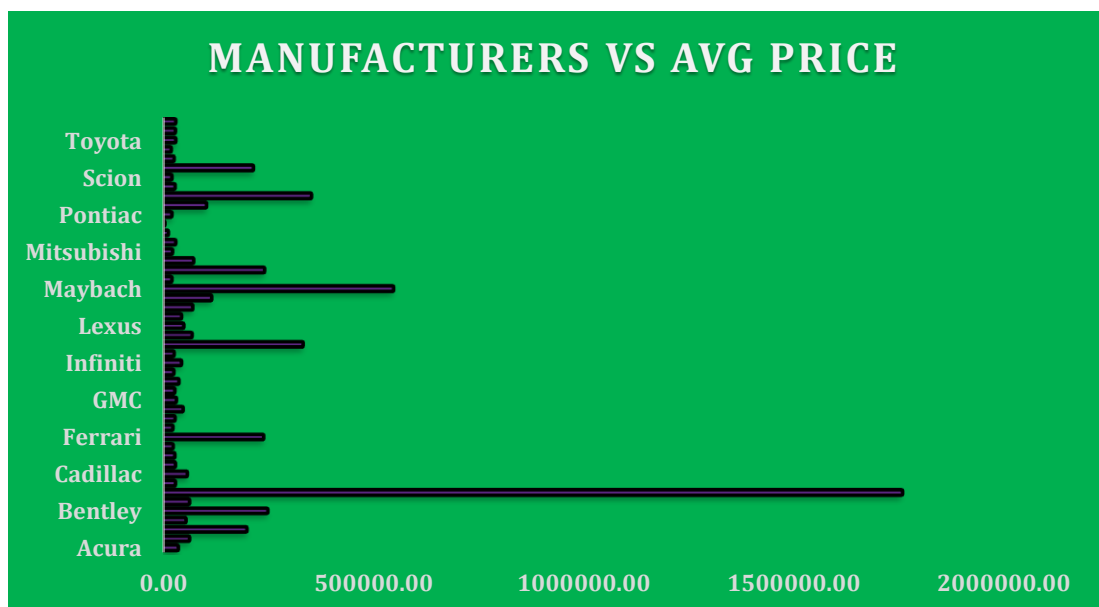


Insight Required: How does the average price of a car vary across different manufacturers?

- **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	34887.59
Alfa Romeo	61600.00
Aston Martin	197910.38
Audi	53452.11
Bentley	247169.32
BMW	61546.76
Bugatti	1757223.67
Buick	28206.61
Cadillac	56231.32
Chevrolet	28273.36
Chrysler	26722.96
Dodge	22390.06
Ferrari	237383.82
FIAT	22206.02
Ford	27393.42
Genesis	46616.67
GMC	30493.30
Honda	26629.82

HUMMER	36464.41
Hyundai	24597.04
Infiniti	42394.21
Kia	25112.39
Lamborghini	331567.31
Land Rover	67823.22
Lexus	47549.07
Lincoln	42494.37
Lotus	69188.28
Maserati	114207.71
Maybach	546221.88
Mazda	19719.06
McLaren	239805.00
Mercedes-Benz	71537.81
Mitsubishi	21215.47
Nissan	28513.37
Oldsmobile	11542.54
Plymouth	3122.90
Pontiac	19321.55
Porsche	101622.40
Rolls-Royce	351130.65
Saab	27413.50
Scion	19932.50
Spyker	213323.33
Subaru	24827.50
Suzuki	17900.96
Toyota	28946.15
Volkswagen	28076.20
Volvo	28541.16
Grand Total	40559.94

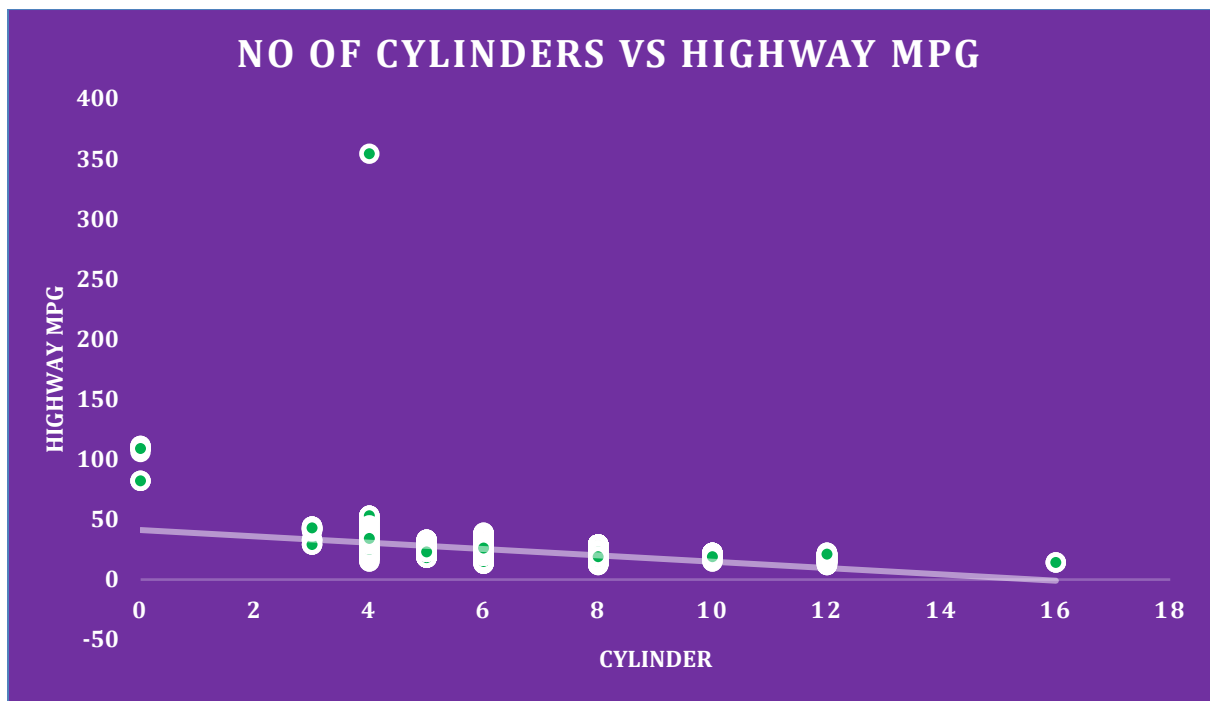


Insight Required: What is the relationship between fuel efficiency and the number of cylinders in a car's engine?

- **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	28
6	25
6	28
6	24
6	24
6	20
6	24
6	21
6	24
6	20

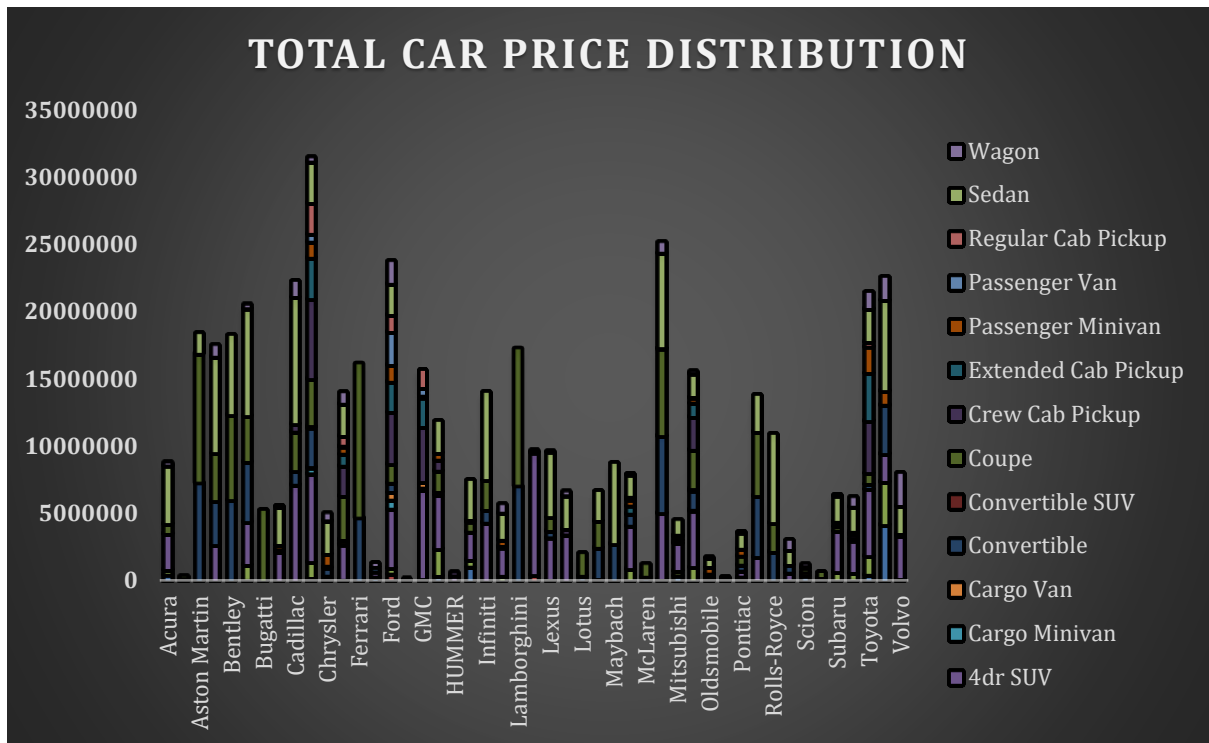
CORRELATION COEFFICIENT	
-	
0.62	SHOWING NEGATIVE CORRELATION



BUILDING THE DASHBOARD

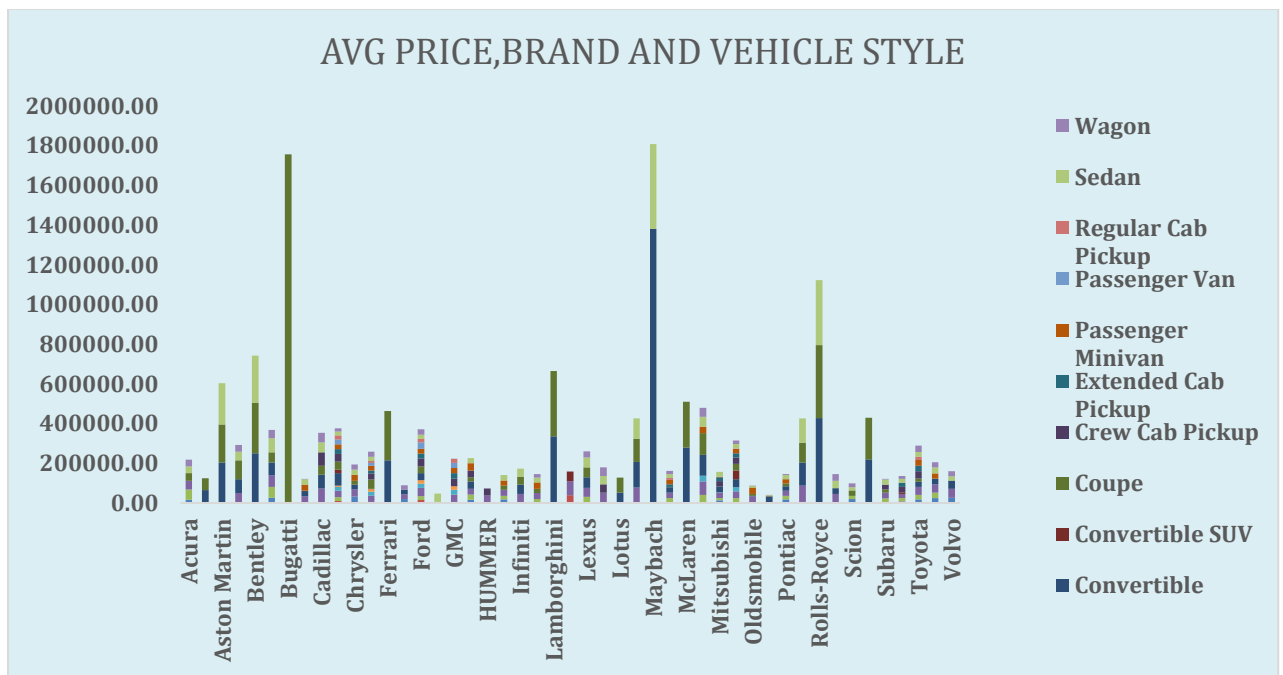
Task 1: How does the distribution of car prices vary by brand and body style?

Sum of MSRP	Column Labels	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	Grand Total
Acura	480917			357440	2663505					793748						4294702	201360	8791672
Alfa Romeo								129800		178200								308000
Aston Martin								7321655		9635275						1448735		18405665
Audi	4000				2674900			3291405		3556390						7158348	847350	17532293
Bentley								6012870		6356760						5920900		18290530
BMW	80097		1144950		3160950			4502671		3419051						7989300	259600	20556619
Bugatti										5271671								5271671
Buick					2141770			179325		18534				330065		2850530	8212	5528496
Cadillac					7182555			985607		2953574	599150					9418847	1184100	22323833
Chevrolet	8000	213310	1209735		6569568	420150	78688	2953245	106300	3504525	5927617	3117951	1178515	607670	2260032	3068812	300675	31524793
Chrysler	98805				250545			630105		114510			922295			2479859	501075	4997194
Dodge	48000	44000	18000		2572405	60520	338497	12000		3264627	2235775	864172	557425		70708	719408	2417585	14016177
Ferrari								4723811		11418289								16142100
FIAT	325315				369305			327965									287570	1310155
Ford	36000	479873	480155	4370871	680770	566351	730007			1398144	3812353	2285584	1271330	2431898	1299240	2299348	1535565	23777489
Genesis																	139850	139850
GMC			144319		6641919	142750	468085				4062482	2183866	150630	603670	1306328			15704049
Honda	413200			2015270	3953209			252135		1588705	787720		553185			2340105		11903529
HUMMER					377490						242405							619895
Hyundai	1038050			528880	2128890					724070			133075			2899937		7452902
Infiniti					4340200			980050		2175750						6494090		13990090
Kia				406960	2049645					142630						494650	601155	5675400
Lamborghini								7064450		10177050								17241500
Land Rover		476394			9076595				145731									9698720
Lexus				94700	3152974			472065		1016472						4817596	31105	9604912
Lincoln					3422570					25342	453260					2458245	269705	6620122
Lotus								413260		1593200								2006460
Maserati					155000			2342963		1972284								6624047
Maybach								2762790								5976800		8739550
Mazda	22000	24000		853180	3222525			870505		14000		580033	443130		265486	1618571	33350	7946780
McLaren								280225		918800								1199035
Mercedes-Benz				122800	4924810	28950		5753964		6473107			32500			7080243	764935	25181309
Mitsubishi	394868			338850	2066505	2000		209893			240210	134360		2000		8000	1058563	4455249



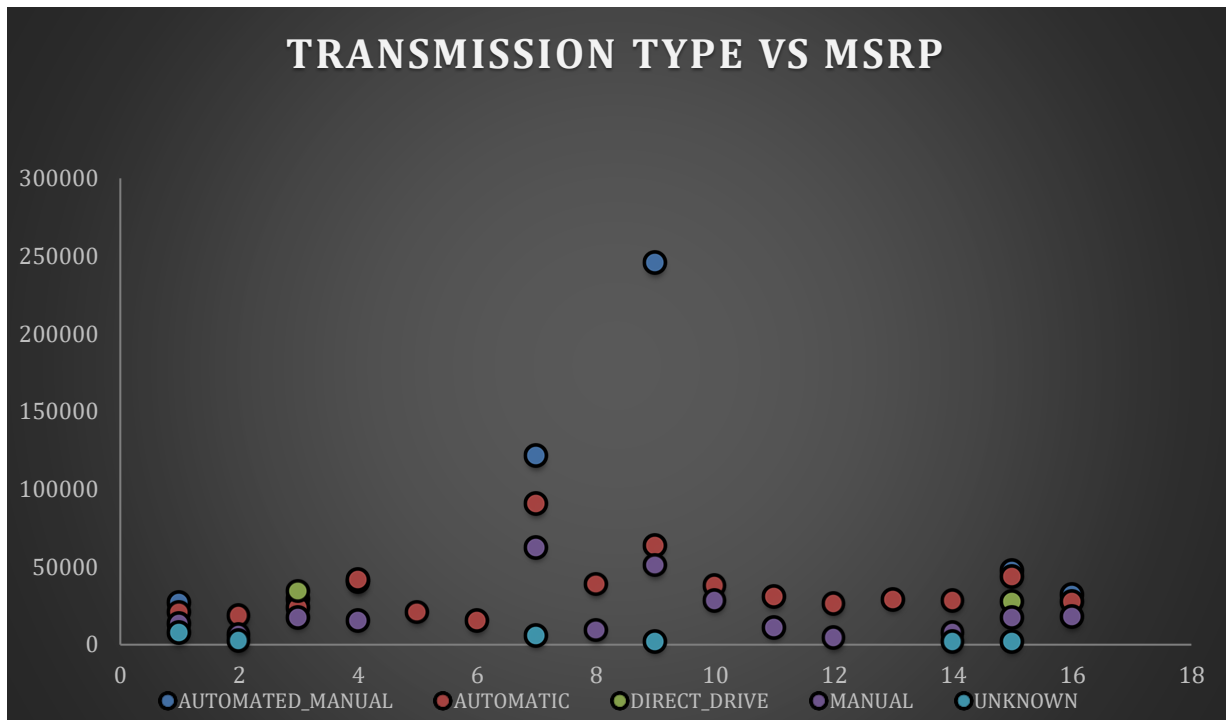
Task 2: Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?

Average of MSRP	Column Labels										
Row Labels	2dr Hatchback	2dr SUV	4dr Hatchback	4dr SUV	Cargo Minivan	Cargo Van	Convertible	Convertible SUV	Coupe	Crew Cab Pickup	Extended Cab Pickup
Acura	17175.61		51062.86	42959.76					39687.40		
Alfa Romeo							64900.00		59400.00		
Aston Martin							203379.31		192705.50		
Audi	2000.00			48634.55			70029.89		93586.58		
Bentley							250536.25		254270.40		
BMW	26699.00		54521.43	58536.11			63417.90		51803.80		
Bugatti									1757223.67		
Buick				33996.35			25617.86		2059.33		
Cadillac				72551.06			70400.50		45439.60	66572.22	
Chevrolet	2000.00	8887.92	18329.32	32046.67	20007.14	7153.45	62835.00	17716.67	38939.17	39255.74	2
Chrysler	32935.00			35792.14			24234.81		19085.00		
Dodge	2000.00	2000.00	2000.00	30992.83	20173.33	12536.93	2000.00		45980.66	31052.43	1
Ferrari							214718.68		248223.67		
FIAT	19136.18			24620.33			23426.07				
Ford	2000.00	13710.66	18467.50	42027.61	21274.06	17698.47	34762.24		34101.07	41438.62	2
Genesis											
GMC		5550.73		36695.69	23791.67	18723.40				39062.33	2
Honda	17216.67		25836.79	28855.54			36019.29		21763.08	34248.70	
HUMMER				37749.00						34629.29	
Hyundai	18536.61		17629.33	30412.71					20687.71		
Infiniti				45686.32			46669.05		40291.67		



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

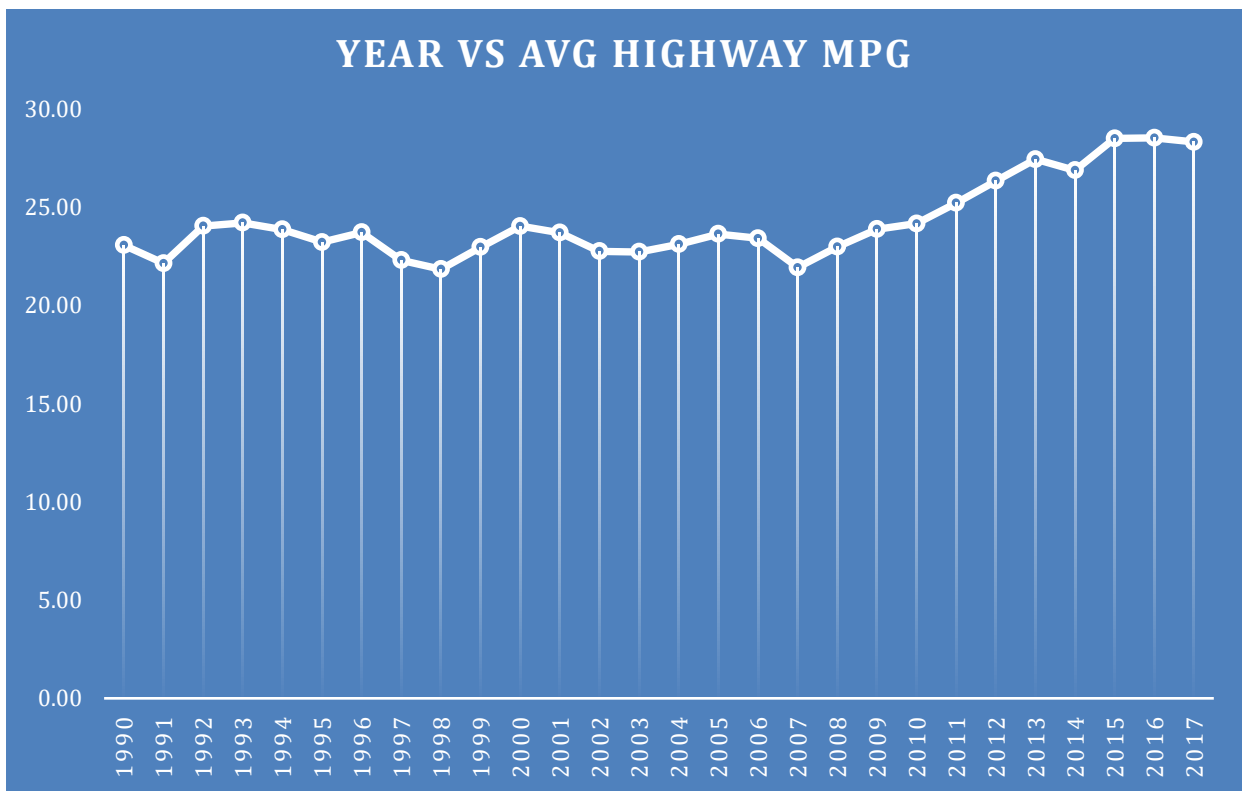
TRANSMISSION TYPE	2dr Hatch	2dr SUV	4dr Hatch	4dr SUV	Cargo Mir	Cargo Var	Convertib	Convertib	Coupe
AUTOMATED_MANUAL	27181		29249.1	40451.2			121257		245588
AUTOMATIC	20926.5	18615.2	23833.7	41555.2	20910.9	15280.2	90637.4	38925.5	63852
DIRECT_DRIVE			34511.9						
MANUAL	13353.7	6303.81	17594.4	15426.5			62357.8	9233.14	51070.5
UNKNOWN	7361.5	2371					5783.5		2000
Grand Total	16778.7	10115.2	22086.3	40426.8	20910.9	15280.2	84224.3	17424.1	76900.7



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

YEAR	AVG OF HIGHWAY MPG
1990	23.07
1991	22.15
1992	24.05
1993	24.22
1994	23.87
1995	23.23
1996	23.73
1997	22.31
1998	21.85
1999	22.98
2000	24.04
2001	23.71
2002	22.77
2003	22.74
2004	23.13
2005	23.64

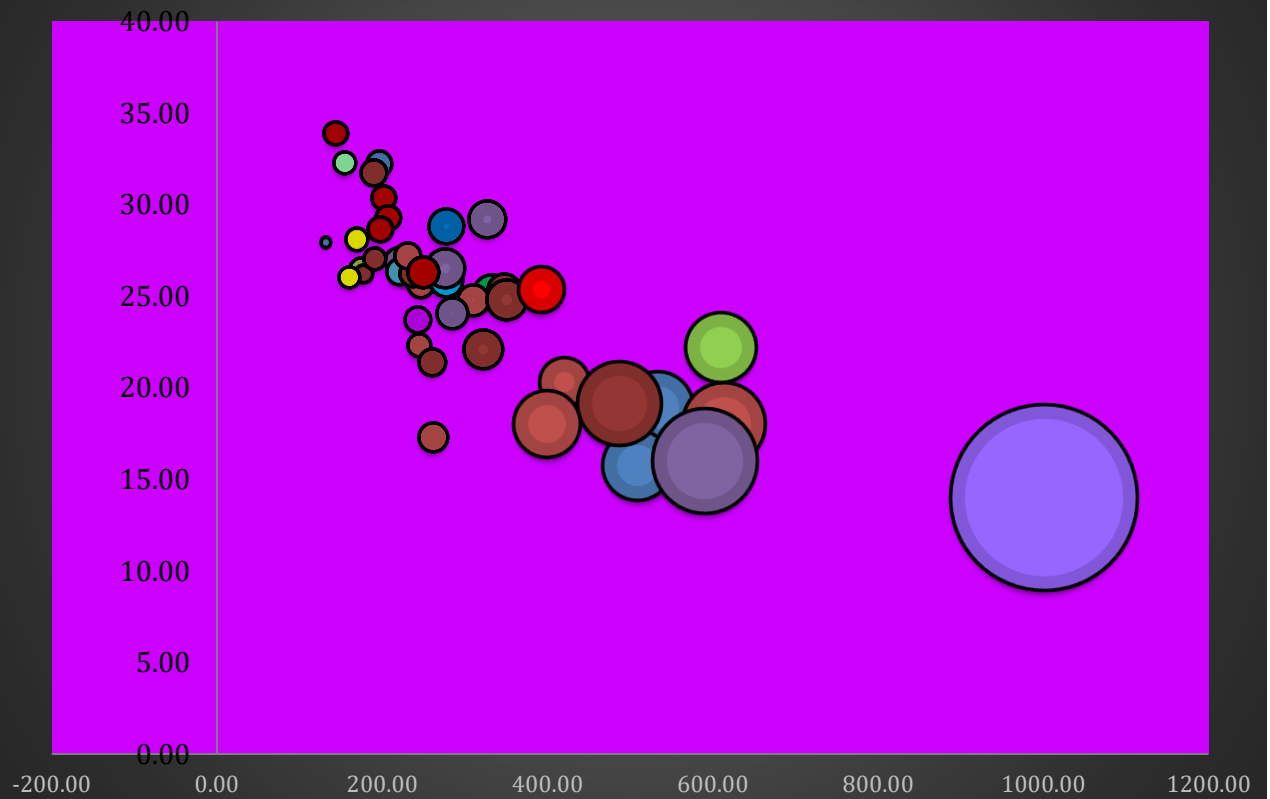
2006	23.42
2007	21.94
2008	22.99
2009	23.89
2010	24.17
2011	25.23
2012	26.35
2013	27.45
2014	26.89
2015	28.51
2016	28.54
2017	28.33
Grand Total	26.32



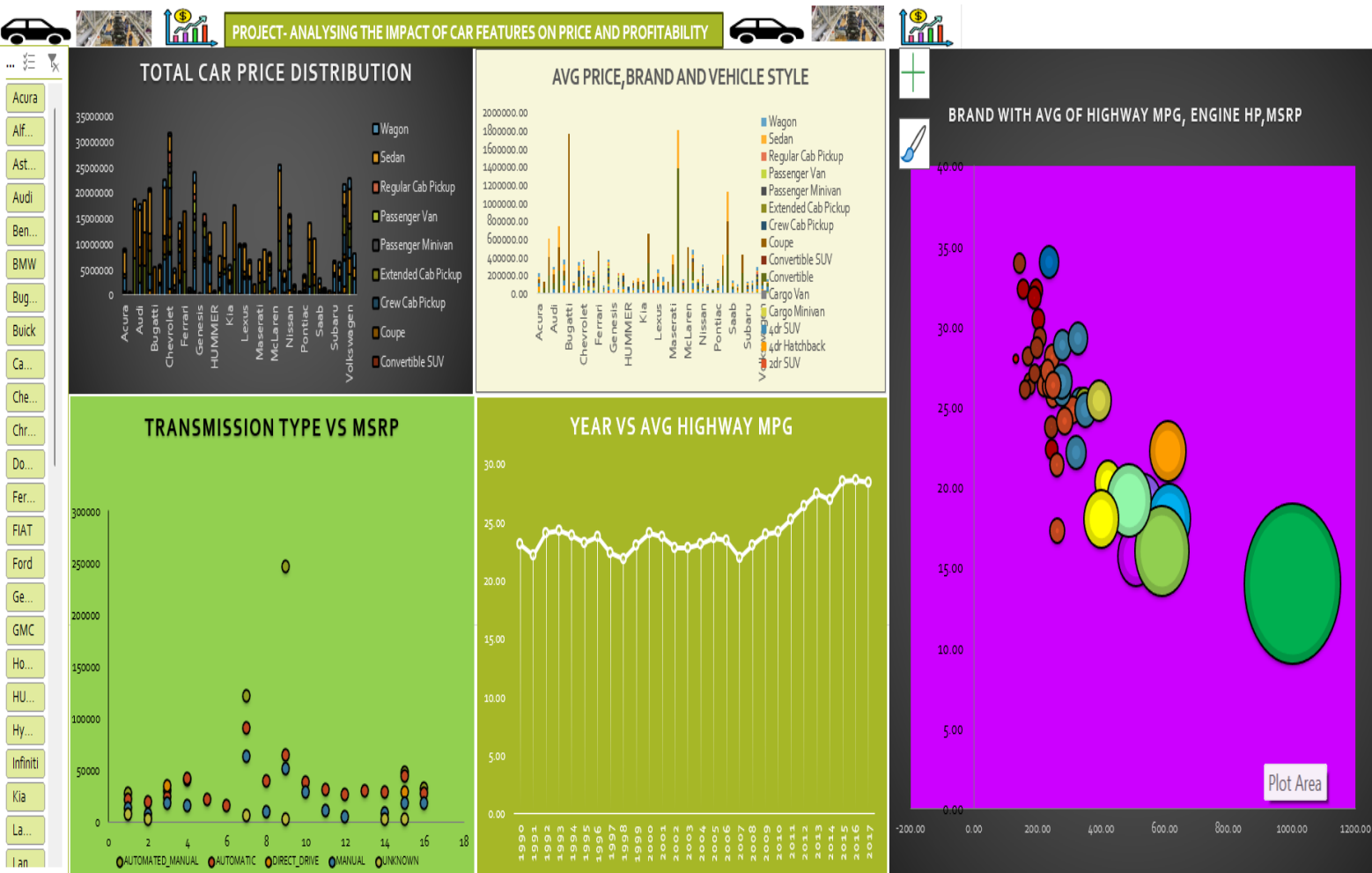
Task 5: How does the car's horsepower, MPG, and price vary across different Brands?

MAKE	AVG OF ENGINE HP	AVG OF HIGHWAY MPG	AVG OF MSRP
Acura	244.80	28.11	34887.59
Alfa Romeo	237.00	34.00	61600.00
Aston Martin	484.32	18.89	197910.38
Audi	277.70	28.82	53452.11
Bentley	533.85	18.91	247169.32
BMW	326.91	29.25	61546.76
Bugatti	1001.00	14.00	1757223.67
Buick	219.24	26.95	28206.61
Cadillac	332.31	25.24	56231.32
Chevrolet	247.06	25.67	28273.36
Chrysler	229.14	26.37	26722.96
Dodge	244.42	22.35	22390.06
Ferrari	509.91	15.72	237383.82
FIAT	143.56	33.92	22206.02
Ford	243.10	23.74	27393.42
Genesis	347.33	25.33	46616.67
GMC	259.84	21.40	30493.30
Honda	195.75	32.25	26629.82
HUMMER	261.24	17.29	36464.41
Hyundai	201.92	30.39	24597.04
Infiniti	310.07	24.78	42394.21
Kia	206.83	29.30	25112.39
Lamborghini	614.08	18.02	331567.31
Land Rover	322.10	22.13	67823.22
Lexus	277.42	25.88	47549.07
Lincoln	284.91	24.10	42494.37
Lotus	275.97	26.55	69188.28
Maserati	420.79	20.29	114207.71
Maybach	590.50	16.00	546221.88
Mazda	169.19	28.12	19719.06
McLaren	610.40	22.20	239805.00
Mercedes-Benz	350.18	24.82	71537.81
Mitsubishi	174.45	26.51	21215.47
Nissan	239.92	26.46	28513.37
Oldsmobile	177.47	26.23	11542.54
Plymouth	131.56	27.96	3122.90
Pontiac	190.30	27.07	19321.55
Porsche	392.79	25.37	101622.40
Rolls-Royce	487.55	19.13	351130.65
Saab	220.52	26.35	27413.50
Scion	154.43	32.30	19932.50
Spyker	400.00	18.00	213323.33
Subaru	197.31	28.68	24827.50
Suzuki	160.33	26.04	17900.96
Toyota	236.26	26.26	28946.15
Volkswagen	190.13	31.77	28076.20
Volvo	230.97	27.20	28541.16
Grand Total	249.50	26.32	40559.94

BRAND WITH AVG OF HIGHWAY MPG, ENGINE HP,MSRP



BUILDING DASHBOARD



EXCEL REFER LINK: - [CAR FEATURES BASED ON PRICE AND PROFIT.xlsx](#)

PPT VIDEO LINK: - <https://drive.google.com/file/d/1WTP54uuJNcD87VDCeSVm8BS6b1scq6So/view?usp=sharing>

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