

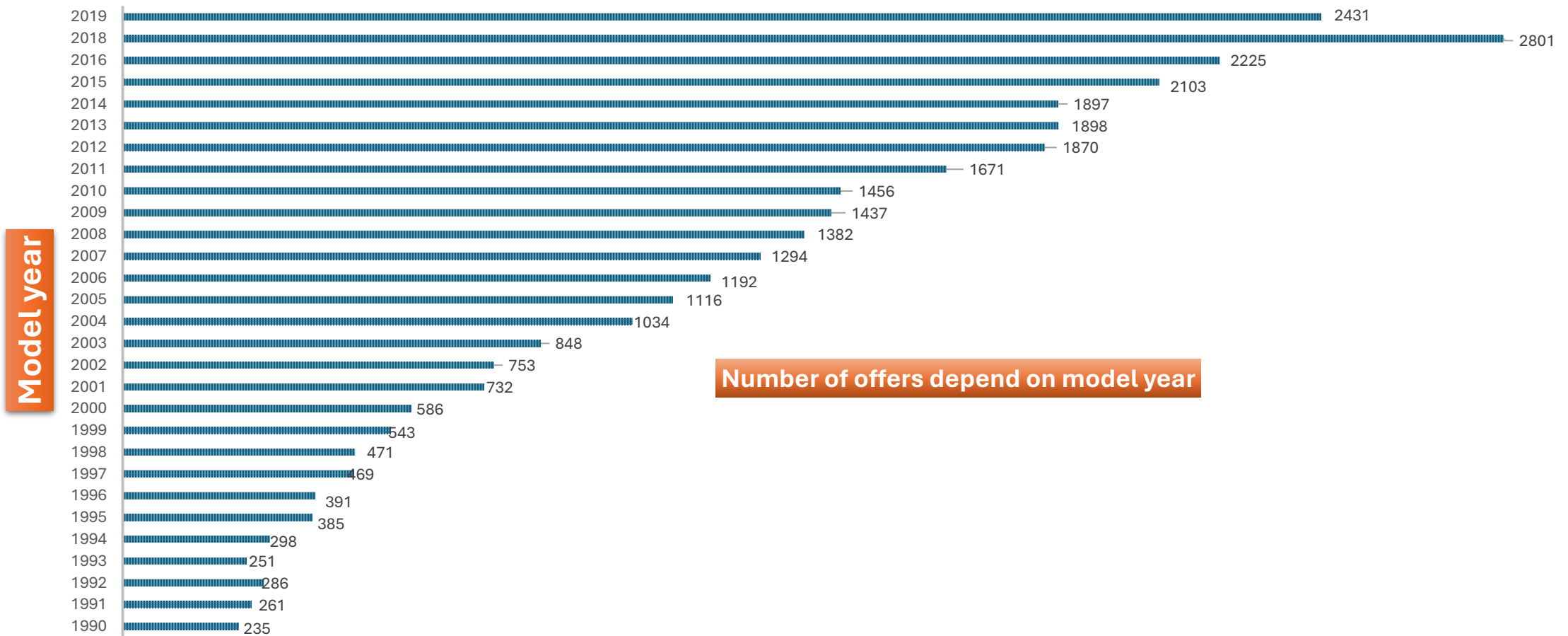


Automotive in USA

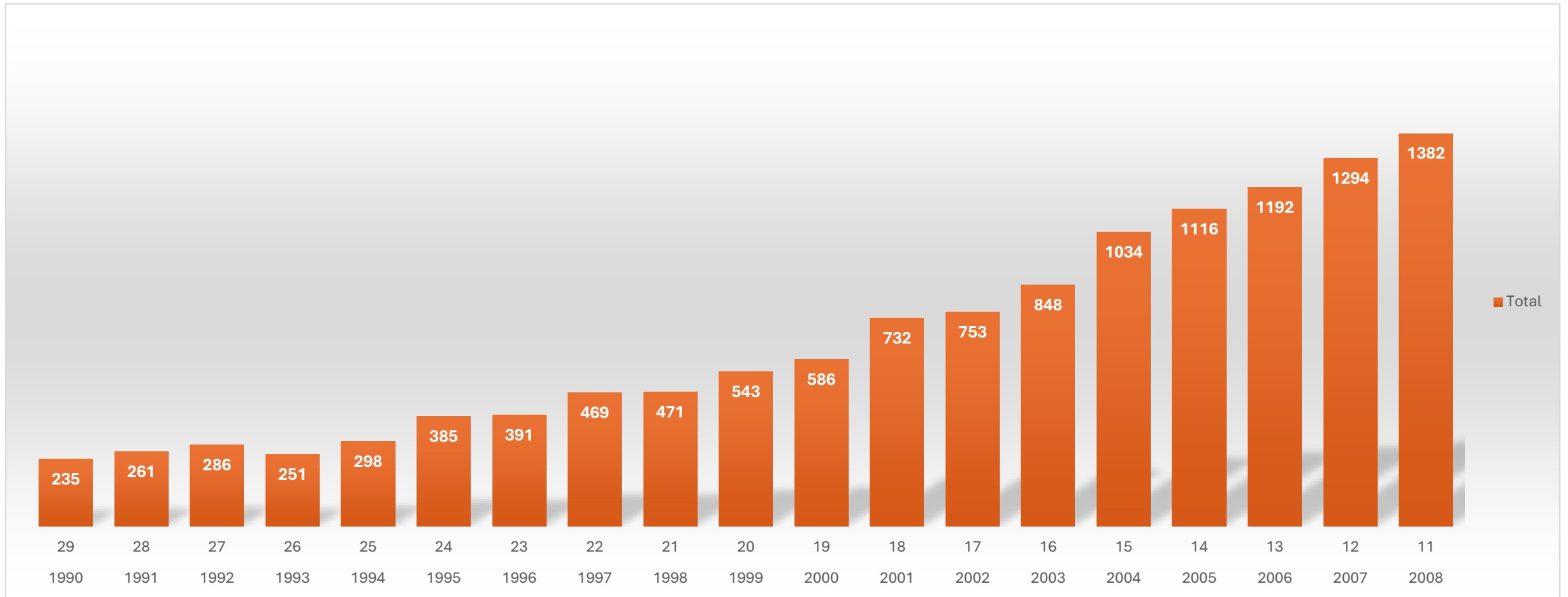
Statistical data on cars sold in 2019

Pavla Šindlerová

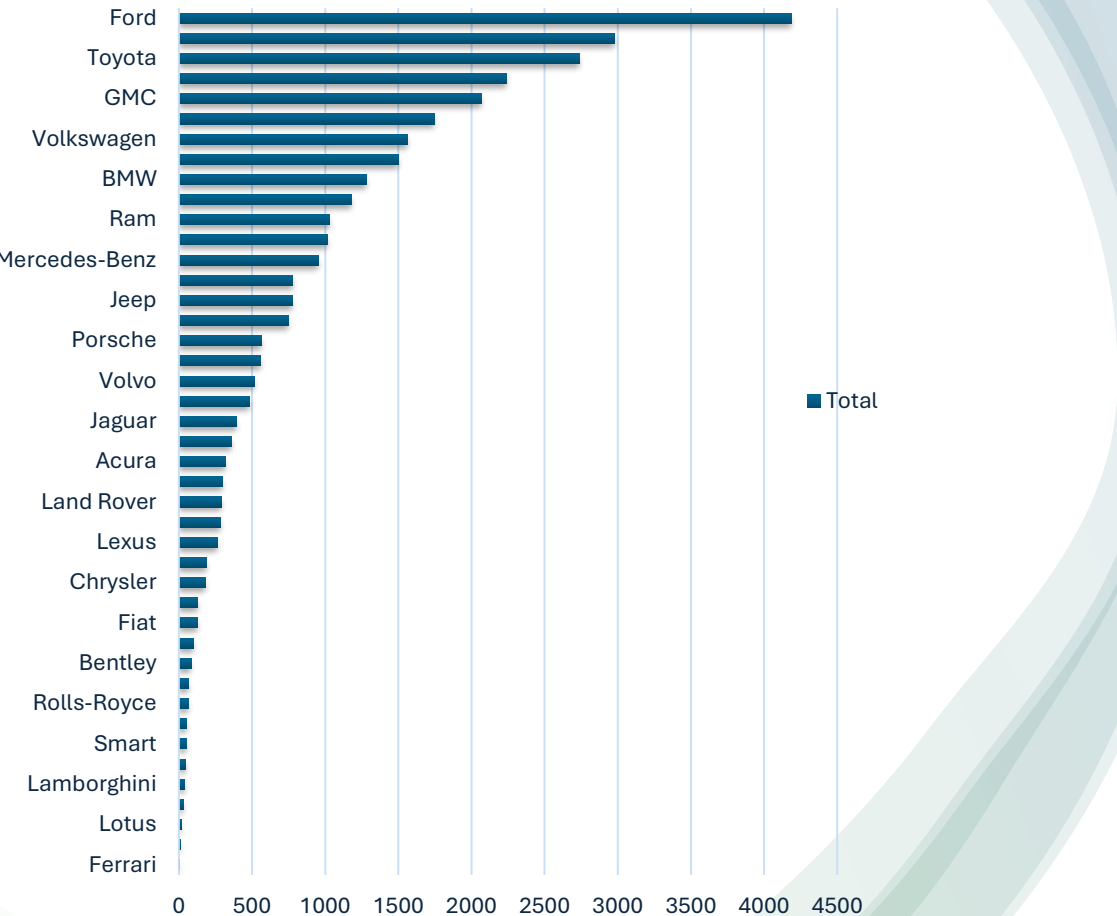
Sales of cars in 2019 according to their age



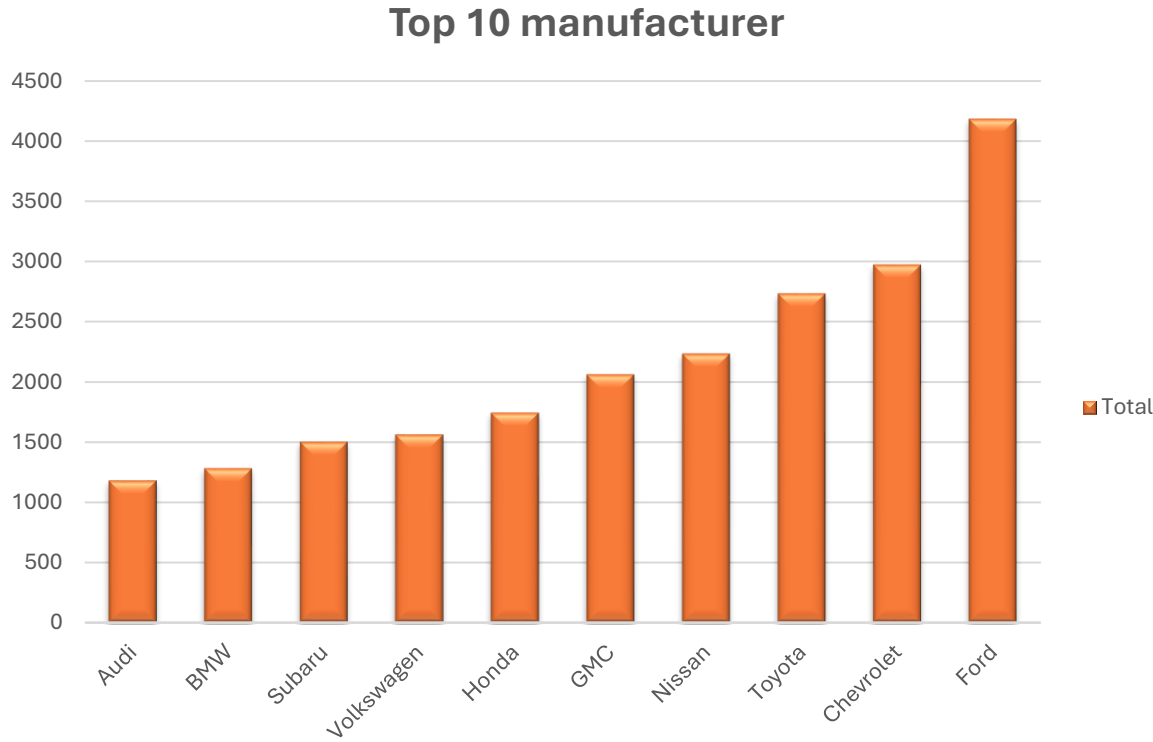
Offered cars older than 10 years



Number of cars sold by manufacturer



TOP 10 manufacturers



Statistical data

	age of car	msrp	mpg	passenger capacity	passenger doors	base curb weight	wheelbase	height	fuel tank capacity	range	displacement	net torque	horsepower
MIN	0	\$6 929	9	0	0	1808	74	44	2	0	1	65	40
MAX	29	\$548 800	66	15	4	8591	178	110	48	790	8	935	808
MEAN	9	\$37 707	20	5	3	3610	118	66	22	151	4	269	258
MEDIAN	8	\$30 555	18	5	4	3497	112	68	20	0	4	260	252
STANDARD DEVIATION	7	\$32 392	5,59	1,82	1	695	18	9	7	185	4	260	252
75Th PERCENTILE	14	\$40 758	22	5	4	4048	126	74	26	342	5	335	310

Statistical data about MSRP

- **Minimum** suggested retail price (MSRP) of **\$6,929**.
- **Maximum** suggested retail Price(MSRP) **\$548,800**.
- **The average** suggested retail price (MSRP) is **\$37,707**.
- Half of the vehicles in the dataset have a suggested retail price (MSRP) less than or equal to **\$30,555** and the other half is priced higher than this value.
- A high **standard deviation** such as **\$32,392** indicates that the vehicle prices in the dataset are very diverse and there are significant differences between the prices of individual vehicles. This means that there are cars with very low and very high prices in the dataset, creating a wide price spread. Prices are highly variable.
- **75% of the vehicles** in the dataset have an MSRP of **\$40,758** or less. Only 25% of vehicles are priced higher than this value.

Statistical data about MPG

A minimum value of 9 MPG (miles per gallon) means that the **2010 Chevrolet Suburban Specs: 4WD 4-Door 2500 LT** is the least fuel-efficient vehicle in the dataset, getting just 9 miles per gallon of fuel. This value shows that the vehicle has a very high fuel consumption and is therefore inefficient in terms of economy.



The most economical car 2019 Toyota Mirai Specs: Sedan

A maximum value of 66 MPG means that **the 2019 Toyota Mirai Specs: Sedan** is the most fuel-efficient vehicle in the dataset, getting up to 66 miles per gallon of fuel. The vehicle is very efficient in terms of fuel consumption, which is typical for hybrid or fully electric cars, or for smaller, **very economical models.**



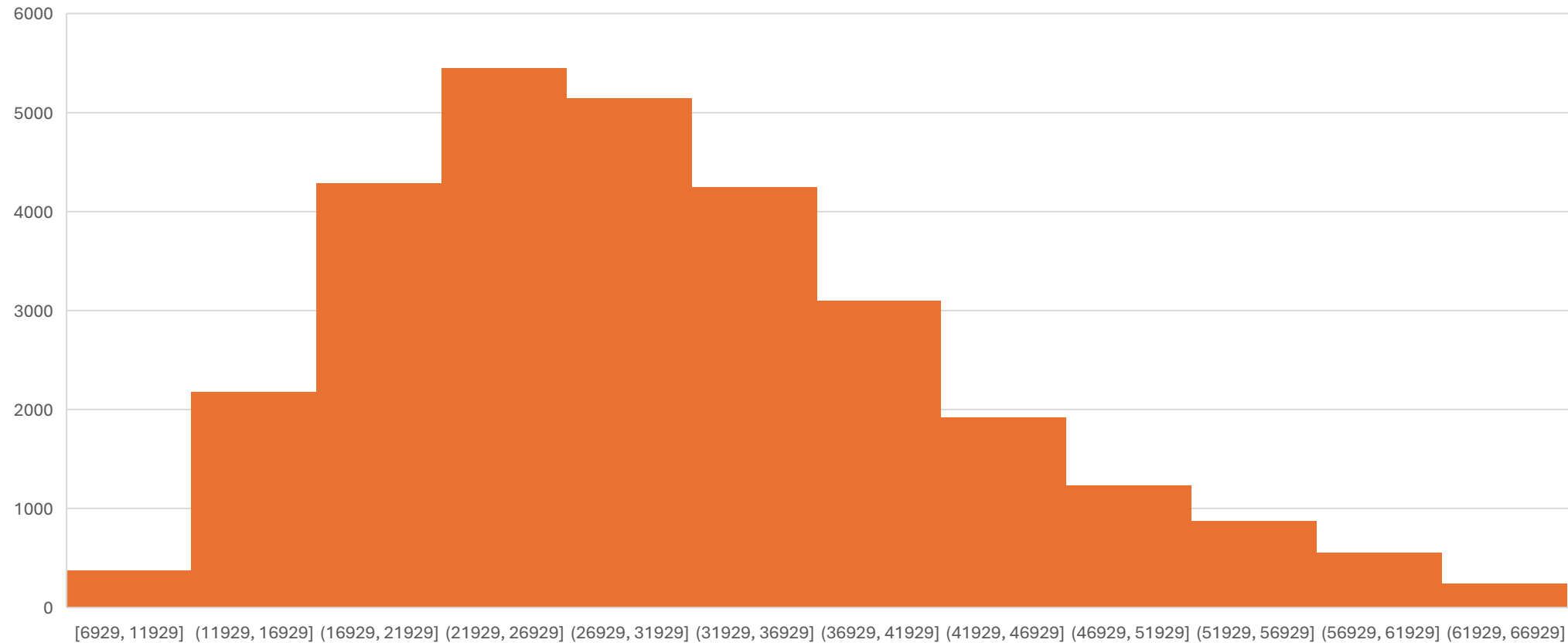
Average combustion(MPG)

- **An average value of 20 MPG** (miles per gallon) means that the average vehicle in the dataset will travel 20 miles on one gallon of fuel. This shows a moderate level of fuel economy. 20 MPG is common for standard passenger cars and smaller SUVs.
- Means that these vehicles **Volvo, Volkswagen, Toyota, Subaru, Porsche, Ram, Audi, BMW, ACURA, Mitsubishi, Nissan, mini cooper, Mercedes-Benz, Mazda, Lincoln, Lexus, Kia, Land Rover, Jaguar, Jeep, Hyundai, Infiniti, GMC, Honda, Ford, Chevrolet, Dodge, Buick, Cadillacs** have an average fuel economy that is neither significantly economical nor very high. Cars with this consumption are considered average in running fuel costs. They may be more fuel efficient than smaller, more fuel-efficient models, but better than larger, more powerful vehicles like large SUVs and trucks.

Statistical data about MPG

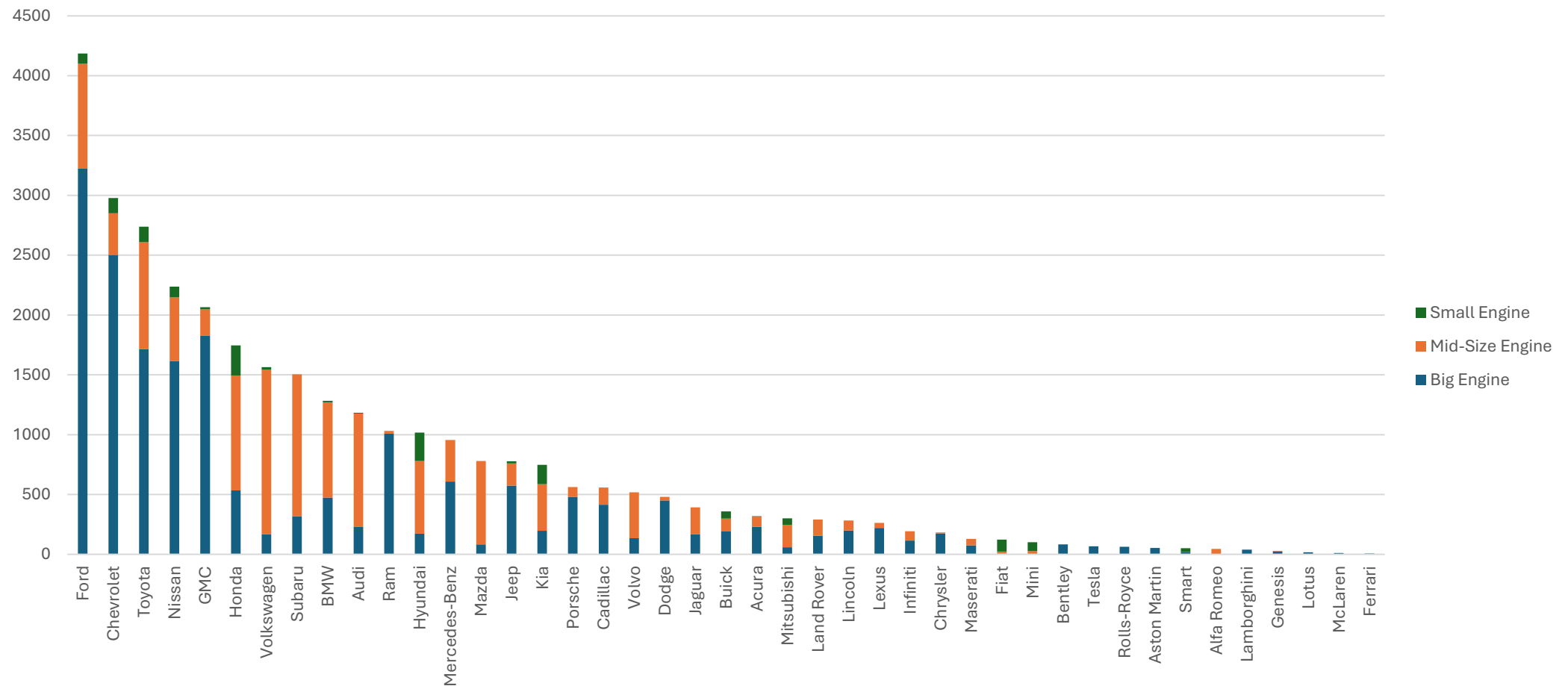
- **A median of 18** means that half of the vehicles in the dataset have a fuel economy of less than or equal to 18 MPG and the other half have a fuel economy of more than 18 MPG. 18 MPG is the average fuel consumption value in the dataset and represents a typical level of fuel economy for vehicles. This figure shows that most cars get around 18 miles per gallon, which is about average for many passenger cars and smaller SUVs.
- **A standard deviation of 5.59** for **MPG** (miles per gallon) means that the average deviation of individual vehicle fuel economy from the mean is 5.59 MPG. The fuel economy of the vehicles in the dataset typically varies by about 5.59 MPG from the average value. The standard deviation of 5.59 is moderately high and indicates that there are differences in fuel consumption in the dataset, but they are not extremely large. It may indicate some variability, where some vehicles have significantly higher or lower consumption than the average.
- **75% of the vehicles** in the dataset have a fuel economy of **22 MPG** or less. Only 25% of vehicles get more than 22 MPG. The majority of vehicles (75%) in the dataset have a fuel economy of less than 22 MPG, indicating that this figure is typical of the majority of cars in the dataset. Vehicles with an MPG higher than 22 are in the most fuel-efficient quarter of the dataset, indicating that only a minority of vehicles have better fuel economy.

Distribution of car prices in the set

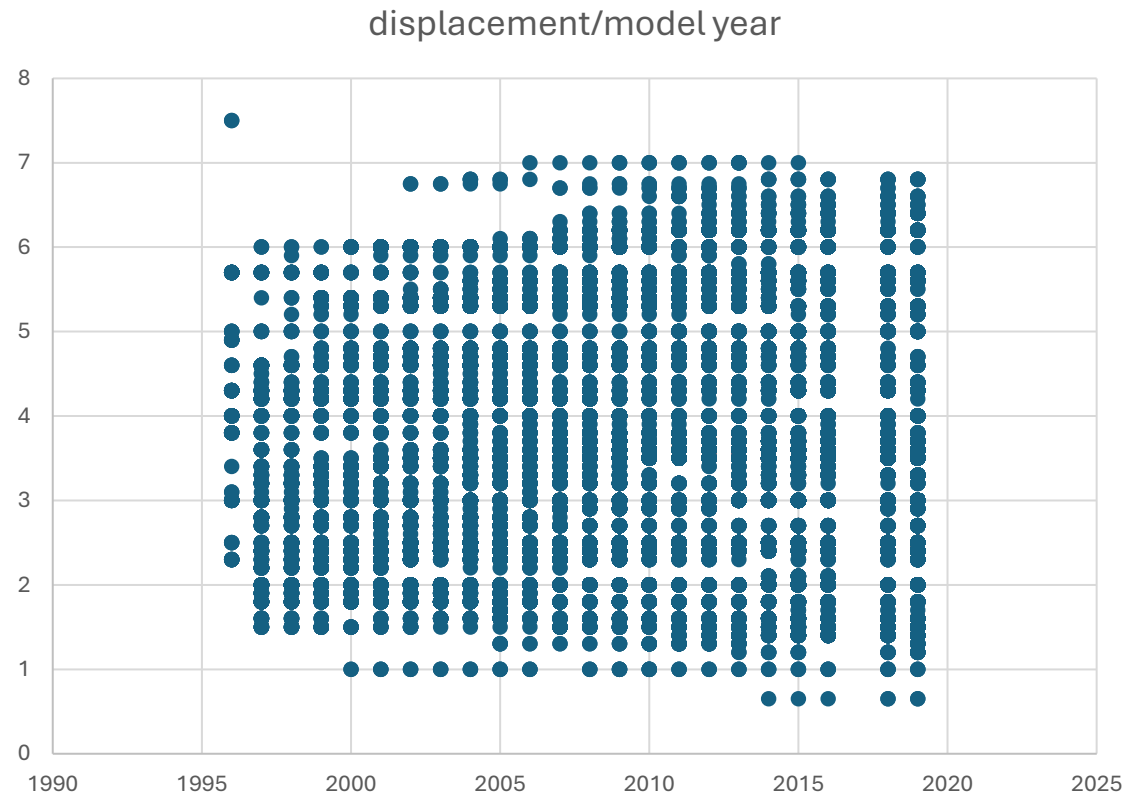


Manufacturers produce more cars with Big engine

Most manufacturers prefer to produce vehicles with Big Engine, but some also focus on Mid-Size Engine, while small engines are the least common.



Pierson's analysis of the relationship between engine displacement and model year

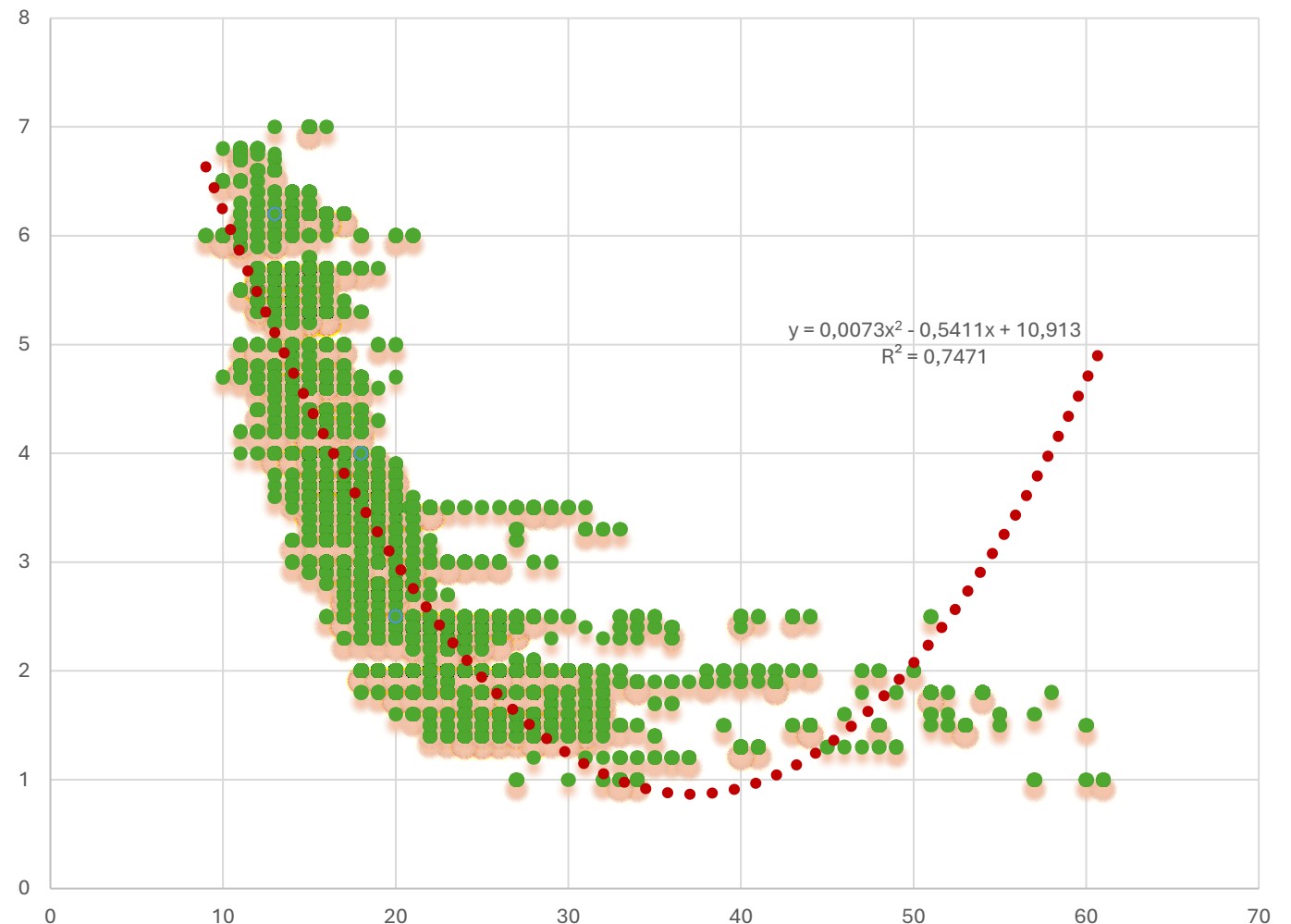


PEARSON = -0,06984

There is no relationship
between model year and
engine displacement.

Analysis of the relationship between average fuel consumption and engine displacement

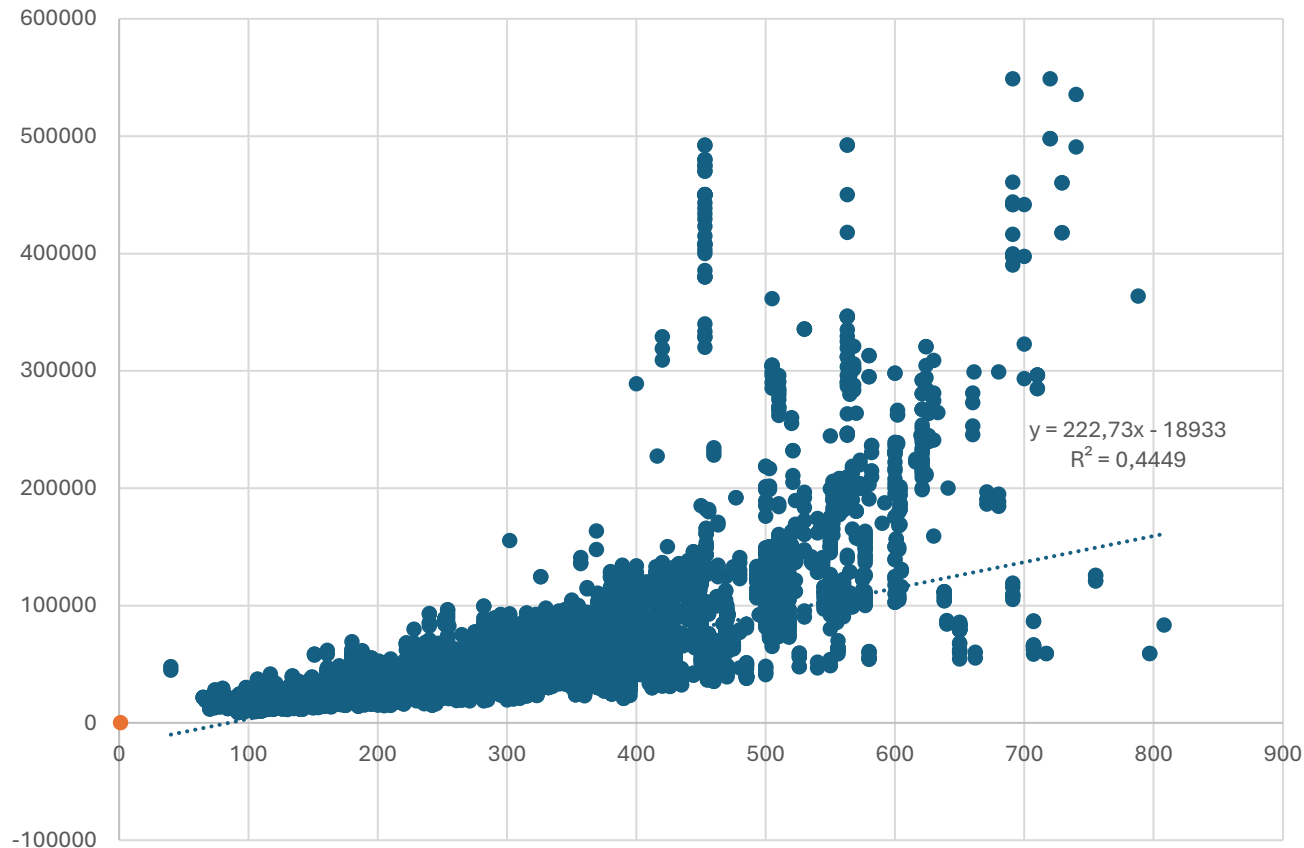
1. A **Pearson correlation coefficient** of **-0.749** indicates a **strong negative relationship between MPG and engine displacement**. This means that as engine displacement increases, fuel economy (MPG) decreases significantly, and vice versa.
2. I chose a **second-order polynomial function** because the curve is not purely exponential or logarithmic, but can have a parabolic character.





The car with the largest engine displacement **8** is
1996 Ford Super Duty F-250 Specs:4-Door 152.2“WB /WB 4WD

Dependence of car price on horsepower



A correlation coefficient of **0.667** indicates a fairly **strong positive relationship** between a car's price (MSRP) and its performance (Horsepower). **Conclusion:** Engine power affects the price of a car, but it is not the only factor that affects it. Nevertheless, we can say that cars with higher performance tend to be more expensive, which is confirmed by the value of this correlation.

Regression Analysis: Relationship Between Car Price and Horsepower

1. **R Square (0,4449):** An R Square (coefficient of determination) value of 0.4449 means that the regression model explains approximately 44.5% of the variability independent variable (MSRP) based on independent variable (Horsepower). This suggests that engine performance explains some of the difference in vehicle price, but there are other factors that influence the price of a car.
2. **Standard Error (24,495.91):** The standard error measures the average deviation of the actual values from the values predicted by the model. The value of 24,495.91 indicates how much the predicted prices can deviate from the actual prices.
3. **Intercept (272):** regression line: $MSRP = 272 + (\text{coefficient for Horsepower}) \cdot \text{Horsepower}$
4. **P-value (0):** The p-value for the coefficient is 0, which means that the relationship between performance and price is statistically significant at the commonly used level of significance (eg 0.05). This shows that performance has a significant effect on the price of the vehicle.

Analysis Conclusion: The regression model shows that there is a statistically significant relationship between engine power and vehicle price that is relatively strong (with an R Square value of around 44.5%). So engine power affects the price of a vehicle, but the model does not explain all the variability, which means there are other factors that also affect the price.

Horsepower of the most powerful car offered

The most powerful car in the dataset is the **2018 Dodge Challenger SRT Demon RWD** with 808 Horsepower.

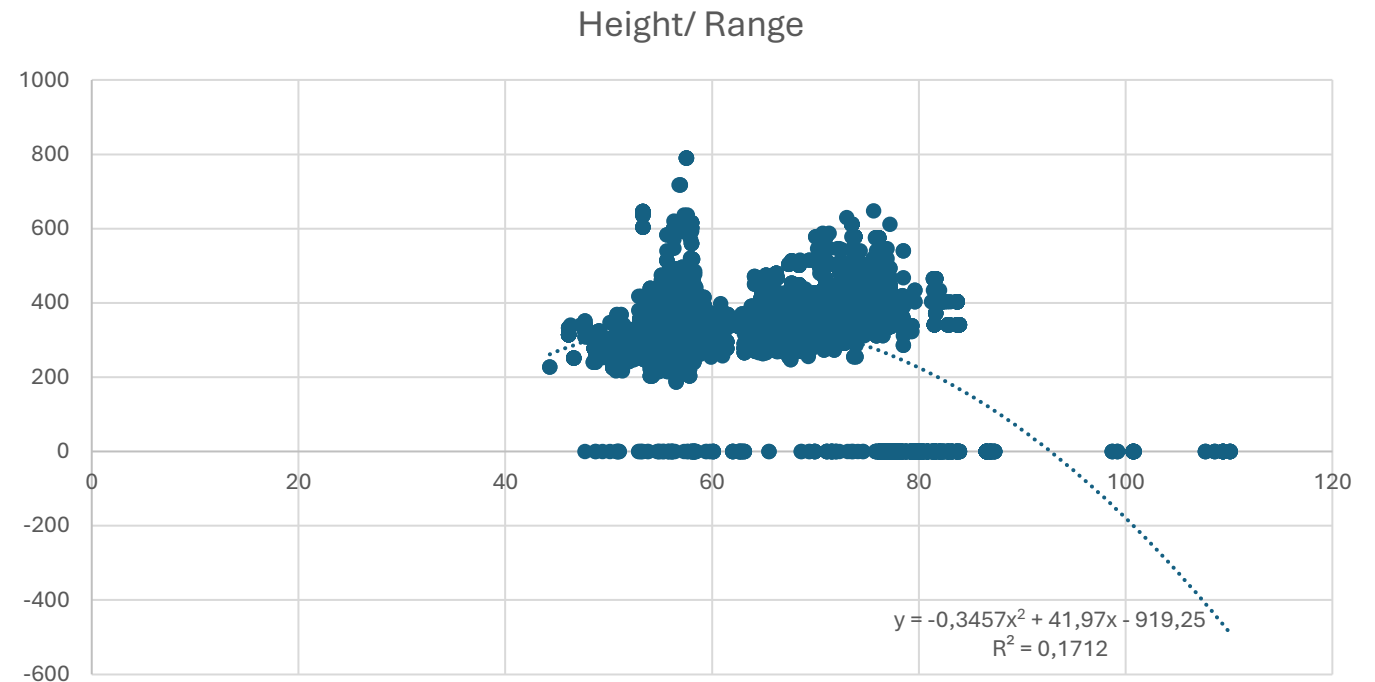


Relationship between range of car and total weight

- Correlation= 0,075638774A
- correlation close to zero (such as this) means that there is virtually **no linear relationship between the two variables**.
- **Conclusion:** Considering this correlation value, we can say that there is **no significant linear relationship** between the total weight of the vehicle and its range.
- This means that **vehicle range is likely to be affected by other factors** such as engine efficiency, tank capacity, aerodynamics and technology used in the vehicle, and not just its total weight.

Relationship between the range of the car and the height of the car

- Correlation= 0,075638774A
- A correlation of -0.3033 suggests a weak to moderately **strong negative relationship** between car range and car height.
- A negative correlation means that range tends to decrease as vehicle height increases.



Relationship between the range of the car and the height of the car

- The value of -0.3033 shows that the relationship is not very strong, but there is some tendency to suggest that taller vehicles (e.g., SUVs, vans) may have a shorter range compared to shorter vehicles (e.g., sedans, sports cars).
- Conclusion: This relationship can be explained by aerodynamics - taller cars have more frontal area, which increases drag and can lead to increased fuel consumption and thus reduced range. The -0.3033 correlation isn't extremely strong, but it does suggest that car height may have some effect on range, even if it's not a major factor.

