Turo Market Analysis - Introduction

Turo description:

1. Often described as the "Airbnb for cars”, Turo is a peer-to-peer car sharing marketplace where individuals can rent out their personal vehicles to others.

Project Goals:

1. The primary goal of this project is to analyze the Turo market in Nashville, TN, and offer recommendations on the most profitable makes, models, and years for potential investors looking to buy vehicles for hosting on Turo to maximize their profits.

2. The secondary goal is to apply statistical tests to enhance decision-making strategies for investors who have already listed a vehicle on the platform.

Methods

Scraping Data from Turo:

1. **Data Collection:** Data was scraped from the Turo website on October 1, 2023, and again on January 2, 2024.
2. **Trip Calculation:** The number of trips for each vehicle during the study period (Q4 2023) was determined by subtracting the total trips on October 1, 2023, from the total trips on January 2, 2024.
3. **Trip Duration Assumption:** An average trip length of three days was assumed, as Turo does not provide individual trip durations.
4. **Revenue Estimation:** Estimated total revenue for each vehicle during the study period was calculated using the formula: estimated revenue = daily price * 3 * number of trips.

Scraping Data from Autotrader:

1. **Data Collection:** At the end of the study period, data was scraped from Autotrader for vehicles within a 50-mile radius of Nashville, TN.
2. **Grouping and Averaging:** Vehicles were grouped by make, model, and year, and the average price for each group was calculated.
3. **Price Mapping:** Average prices were mapped back to the Turo dataset to estimate the value of each vehicle.
4. **Estimating Missing Values:** For the 103 out of 469 vehicles in the Turo dataset without matching Autotrader values, estimates were generated using ChatGPT based on make, model, and year.

ROI Calculation and Usage:

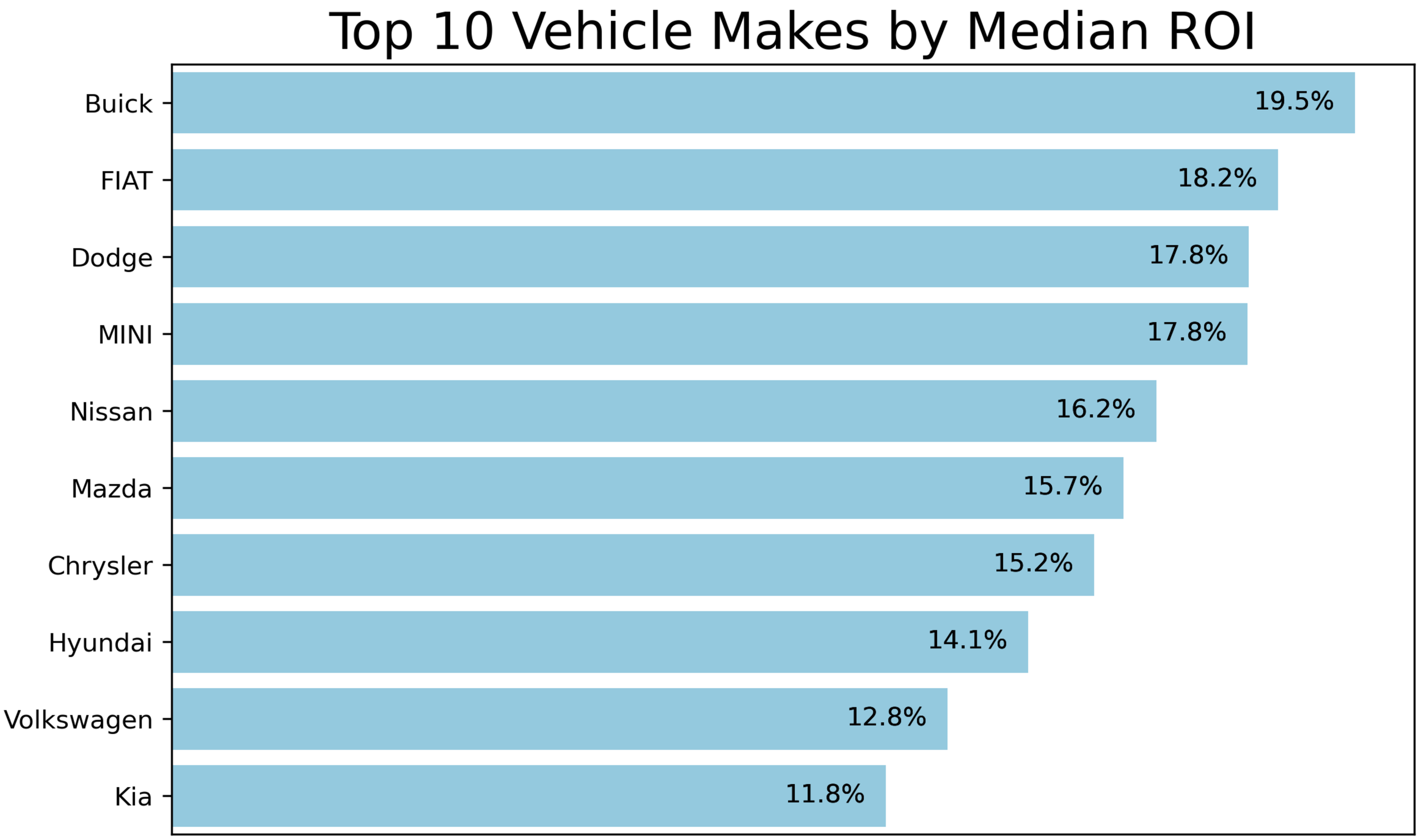
1. **ROI Calculation:** The return on investment (ROI) for each vehicle over the three-month period was calculated using the formula: ROI = estimated revenue / estimated vehicle value.
2. **ROI Interpretation:** ROI represents the percentage of the vehicle's value that was generated as revenue in the three-month study period.
3. **ROI Application:** This ROI metric will be used throughout the analysis as the primary measure of a vehicle's success on the platform.

Part One: Data Exploration

Part one of this project focuses on the following:

1. Analyzing the top-performing vehicles by make, model, year, and type.
2. Identifying key trends and patterns in vehicle performance.
3. Examining the distributions of these variables to better understand nuance in vehicle performance.

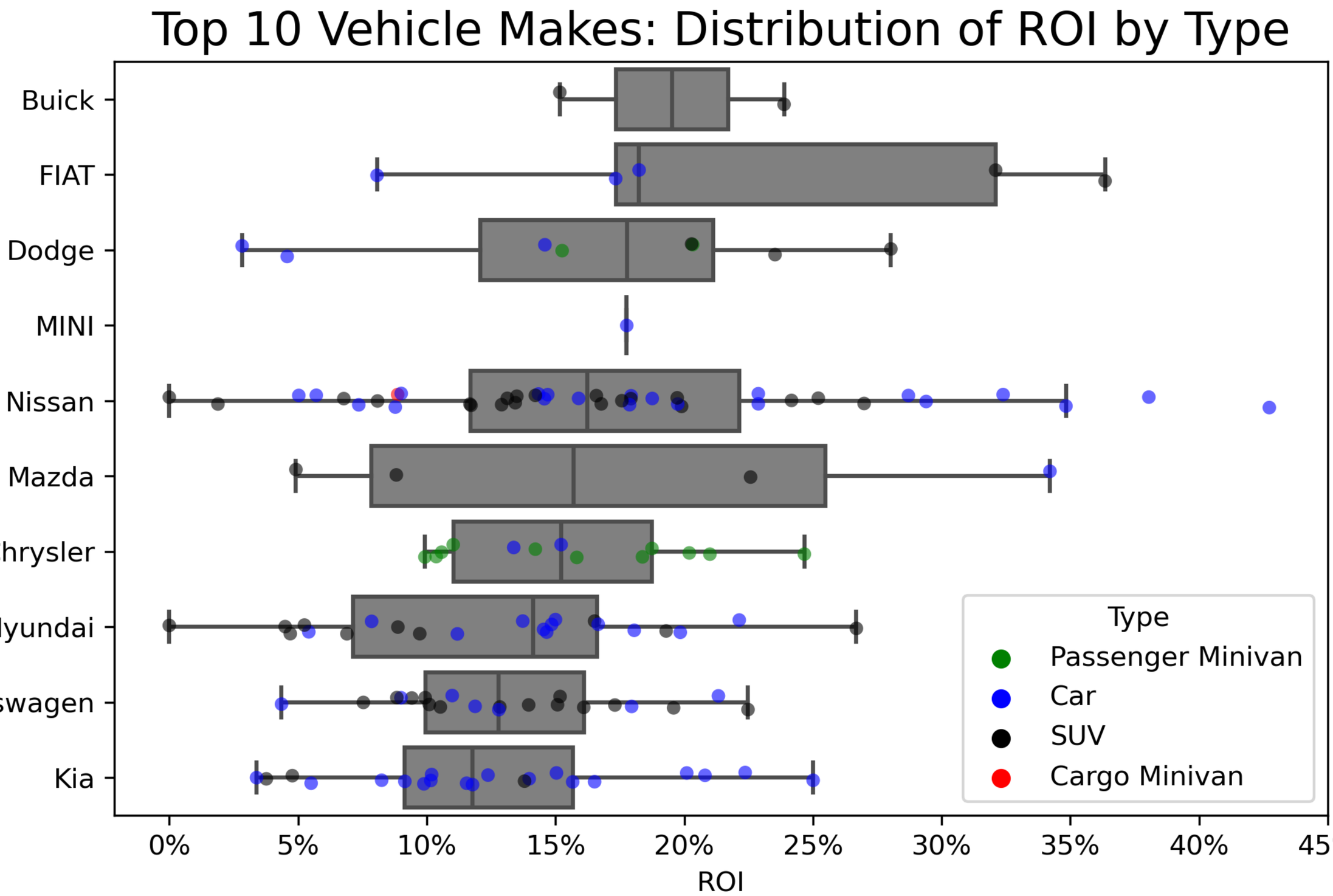
Which vehicle makes are performing the best?



1. A visualization of the top 10 highest performing makes on the platform provides a high-level overview of which brands are popular for renters.

2. The next slide provides more nuance about each of these makes.

Diving deeper into the top performing vehicle makes



1. Buick only has SUVs.

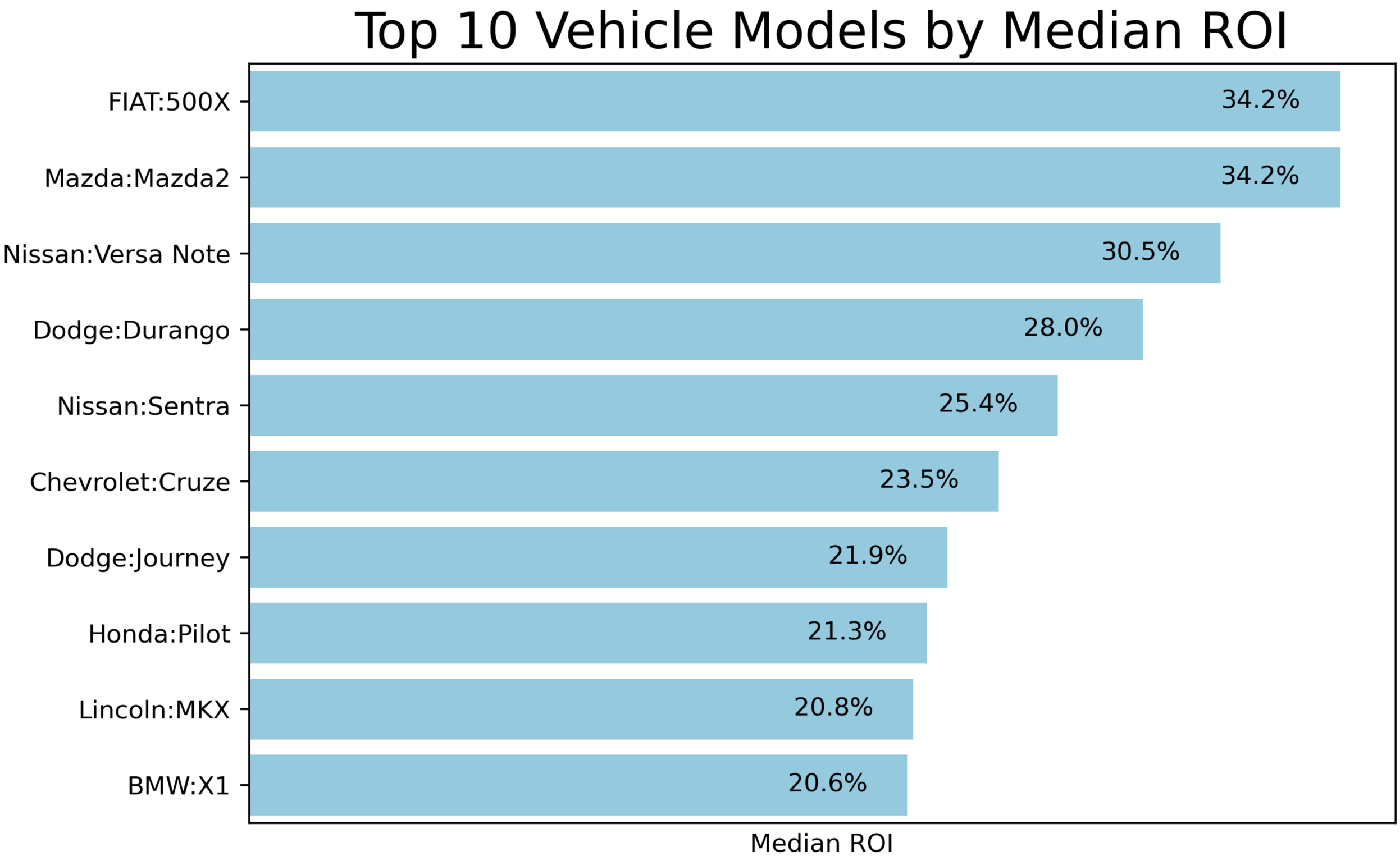
2. MostChryslers are Passenger Minivans.

3. FIAT and Dodge SUVs are outperforming their car counterparts.

4. Nissan has the most vehicles and the widest performance range among all makes.

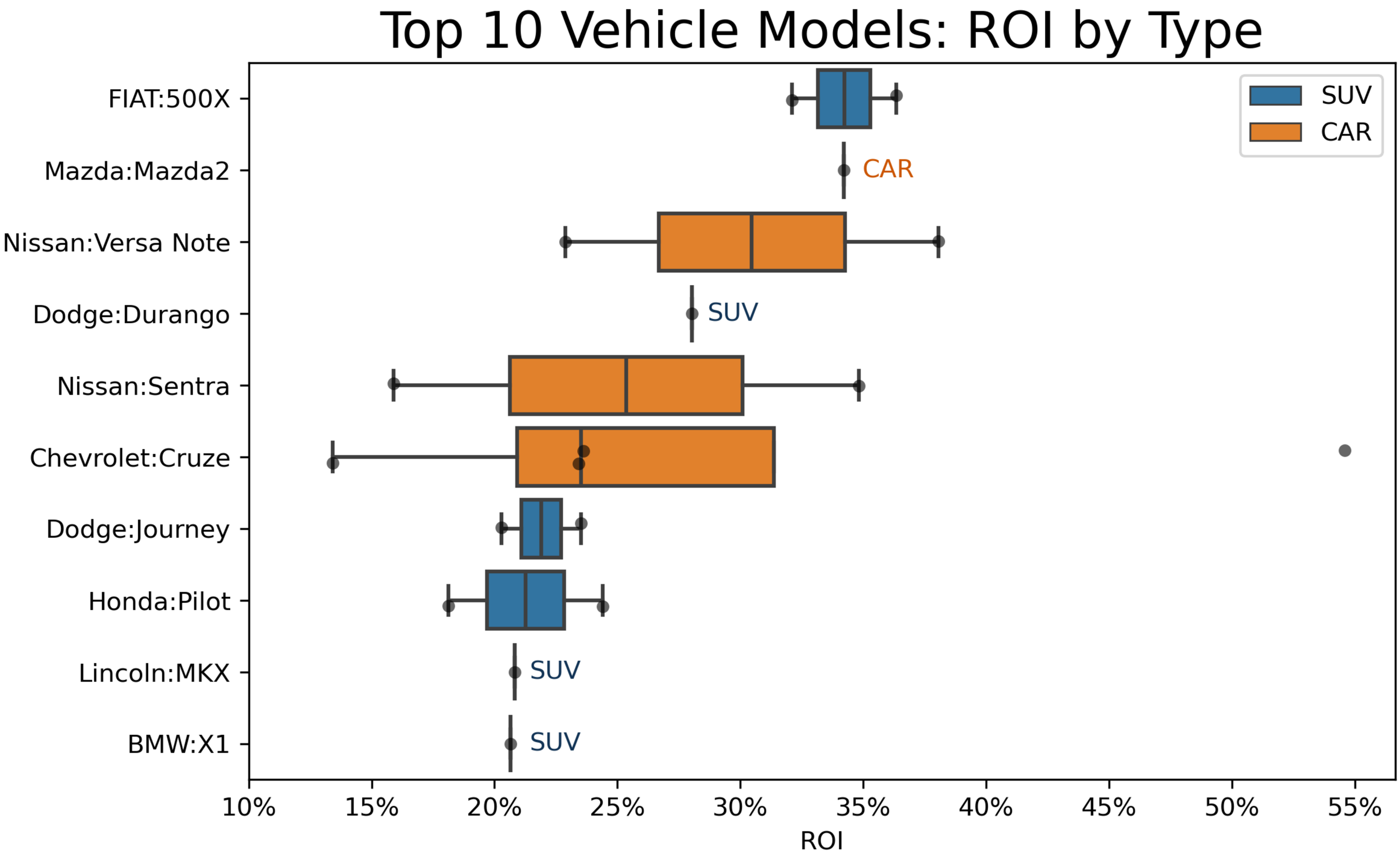
5. Cars are the top performing vehicles for Nissan.

Which vehicle models are performing the best?



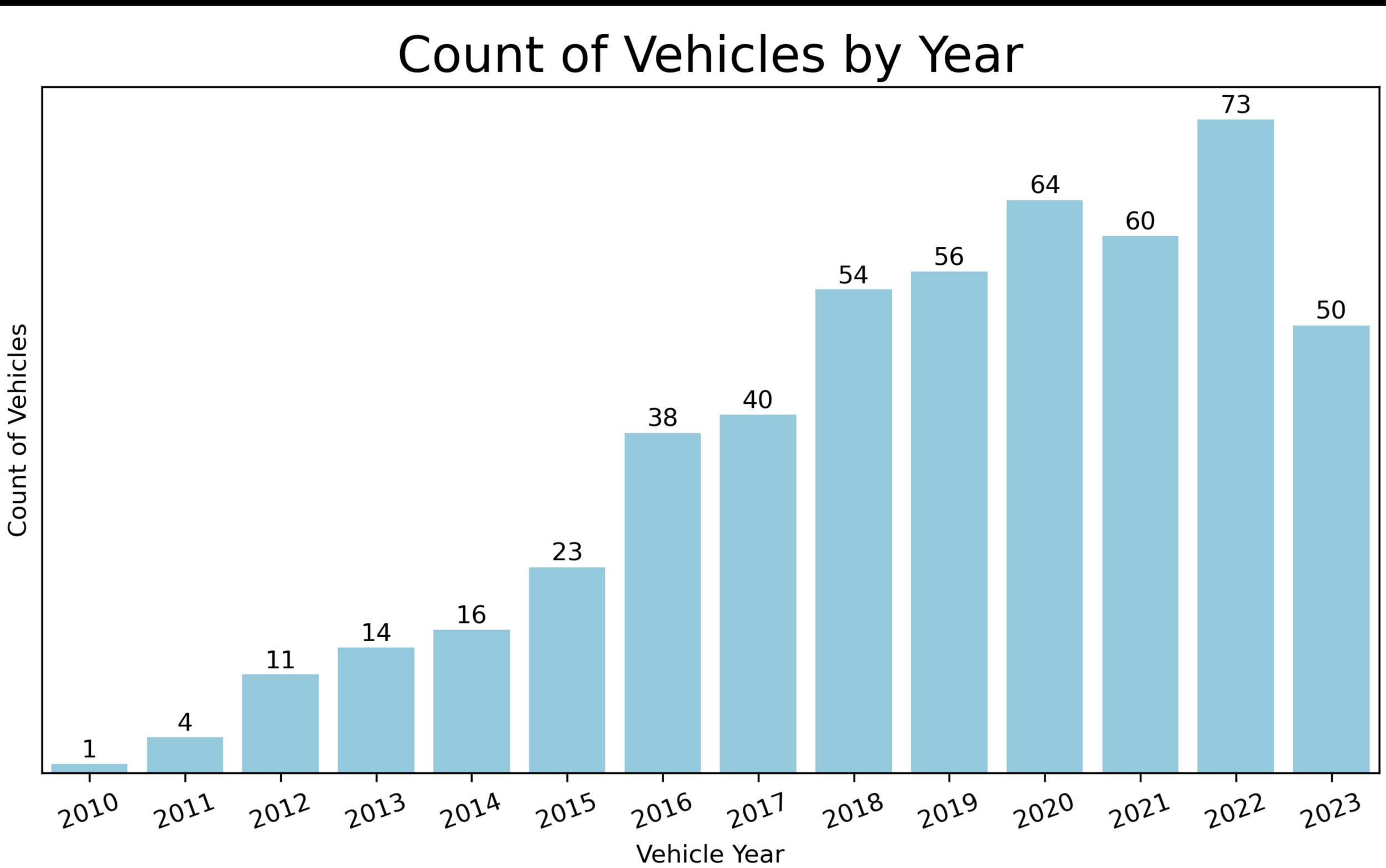
1. A visualization of the top 10 highest performing models on the platform provides a high-level overview of which brands are popular for renters.

Diving deeper into the top performing vehicle models



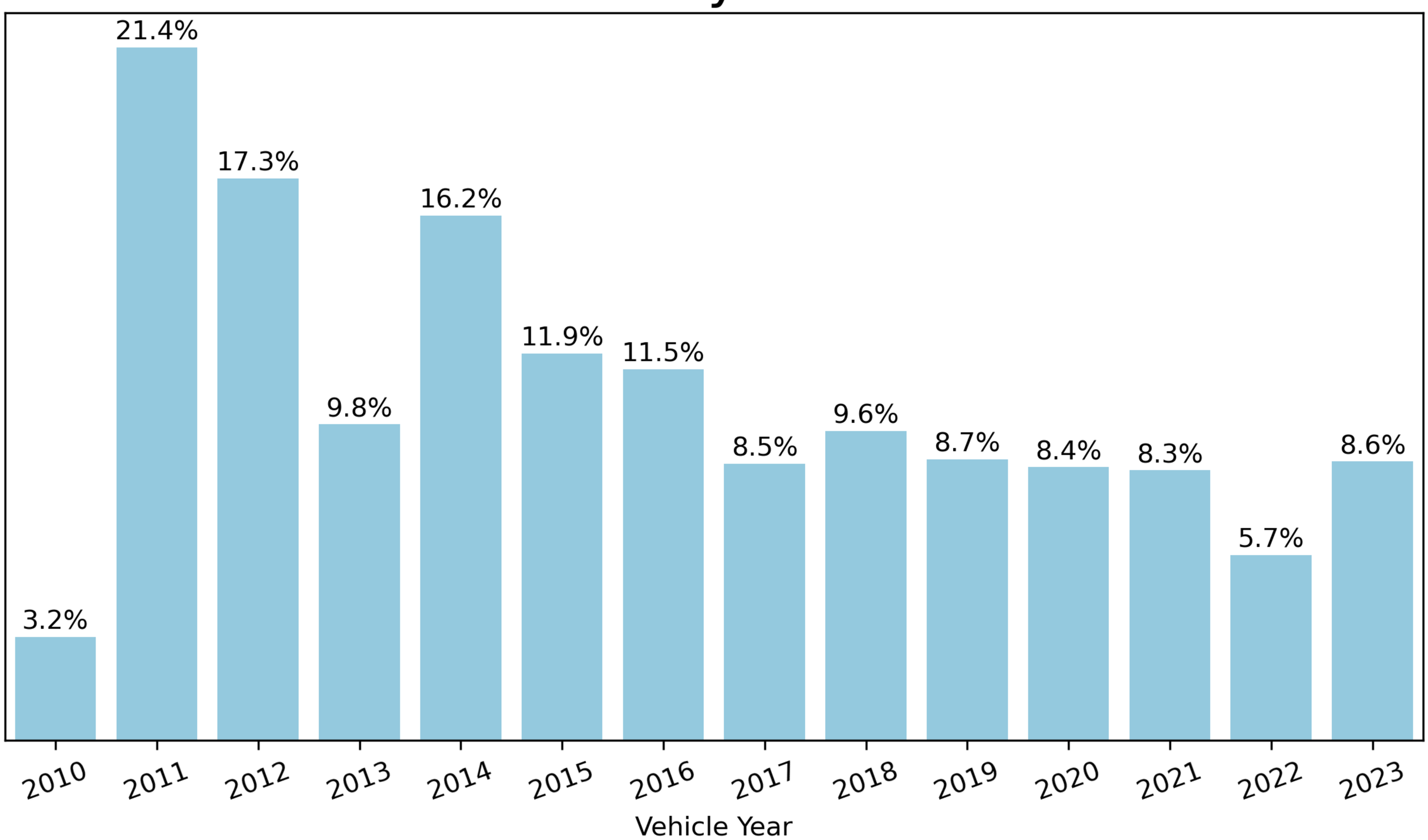
1. The top-performing model is the FIAT 500X, with two units on the platform, both showing similar performance.
2. The distribution for the Chevrolet Cruze is very wide, with one vehicle performing very well and another performing poorly.

How many vehicles from each year?



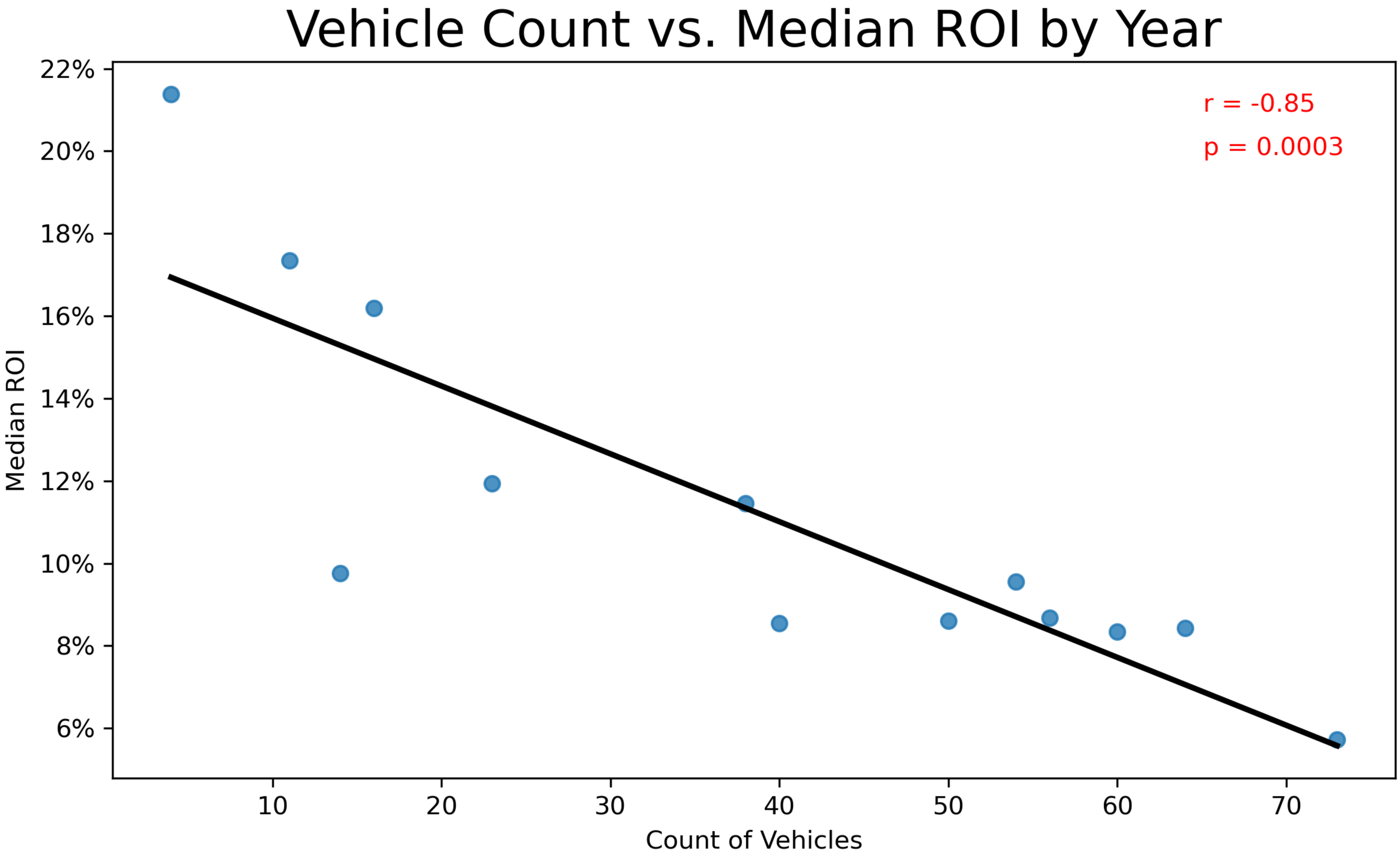
1. The trend indicates that as the model year increases, the count of vehicles also increases – newer model years have more vehicles currently hosted on the platform.

Trend in performance by year



1. There is a clear downward trend – ROI decreases as the year of the vehicle increases.
2. This could be because the market is oversaturated for newer models.

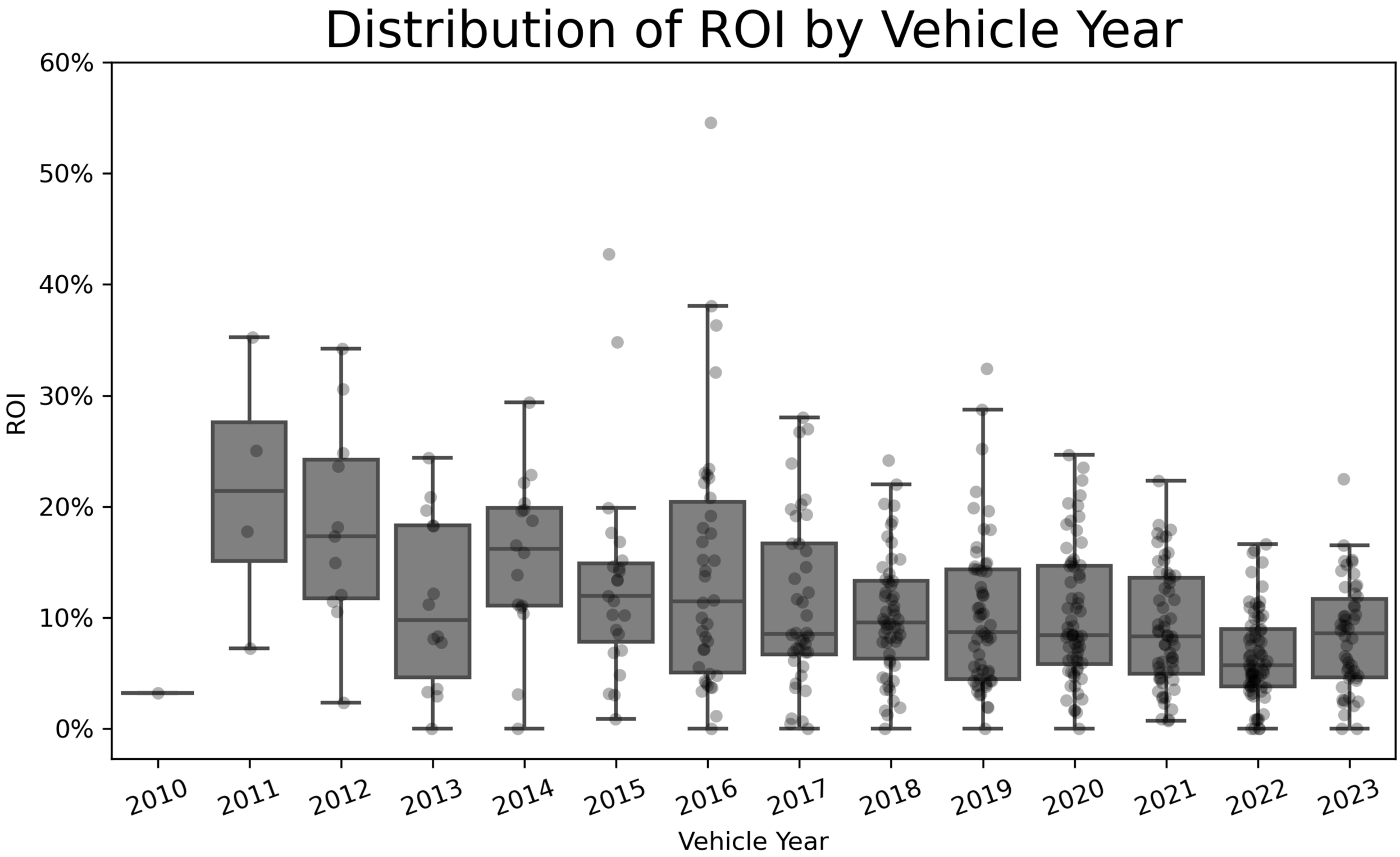
Predicting performance based on vehicle count



1. Each blue dot represents a distinct year in the dataset.

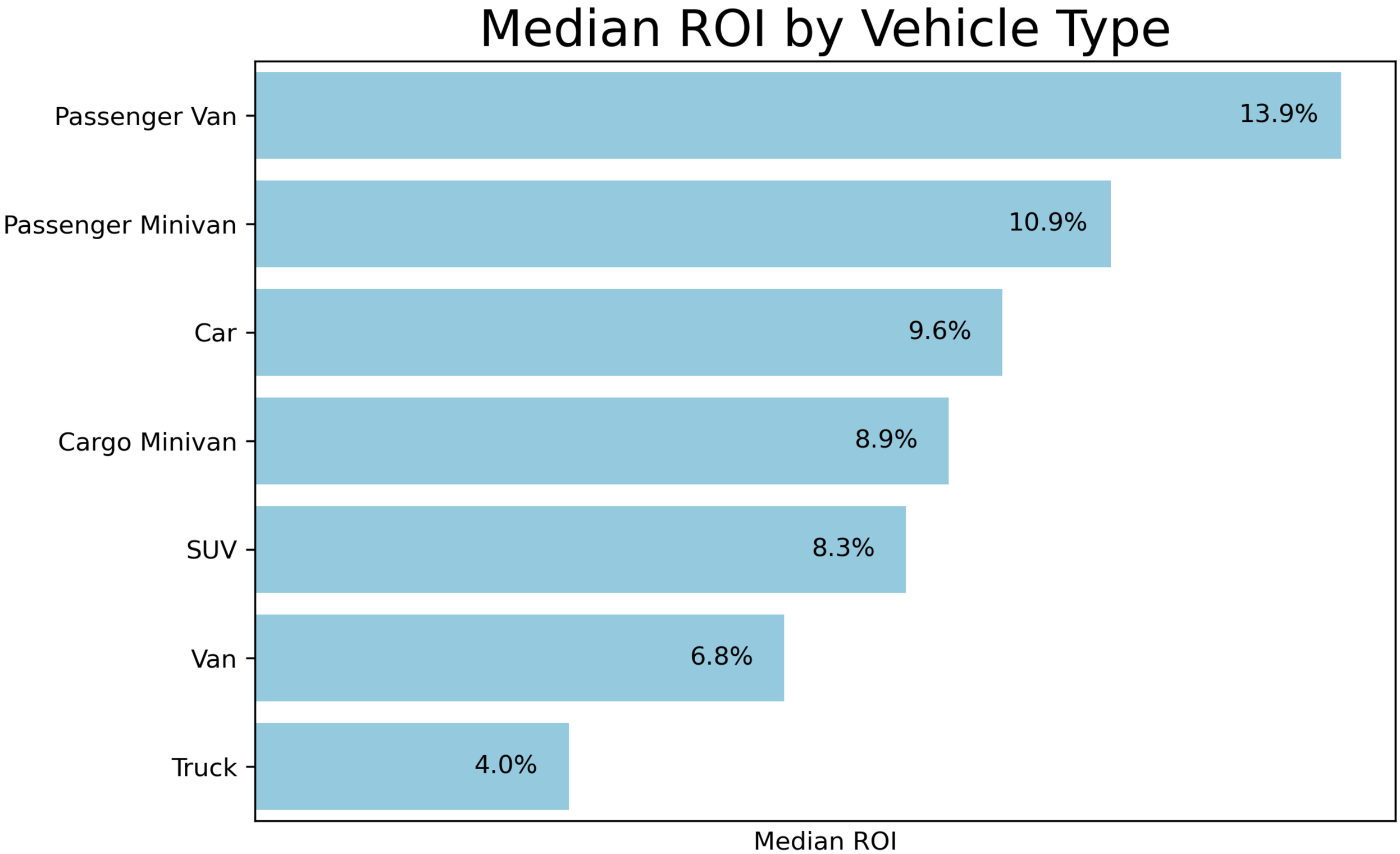
2. ROI can be predicted using the count of vehicles for any given year – as the count of vehicles for that year increases, the predicted ROI decreases.

Diving deeper into vehicle years



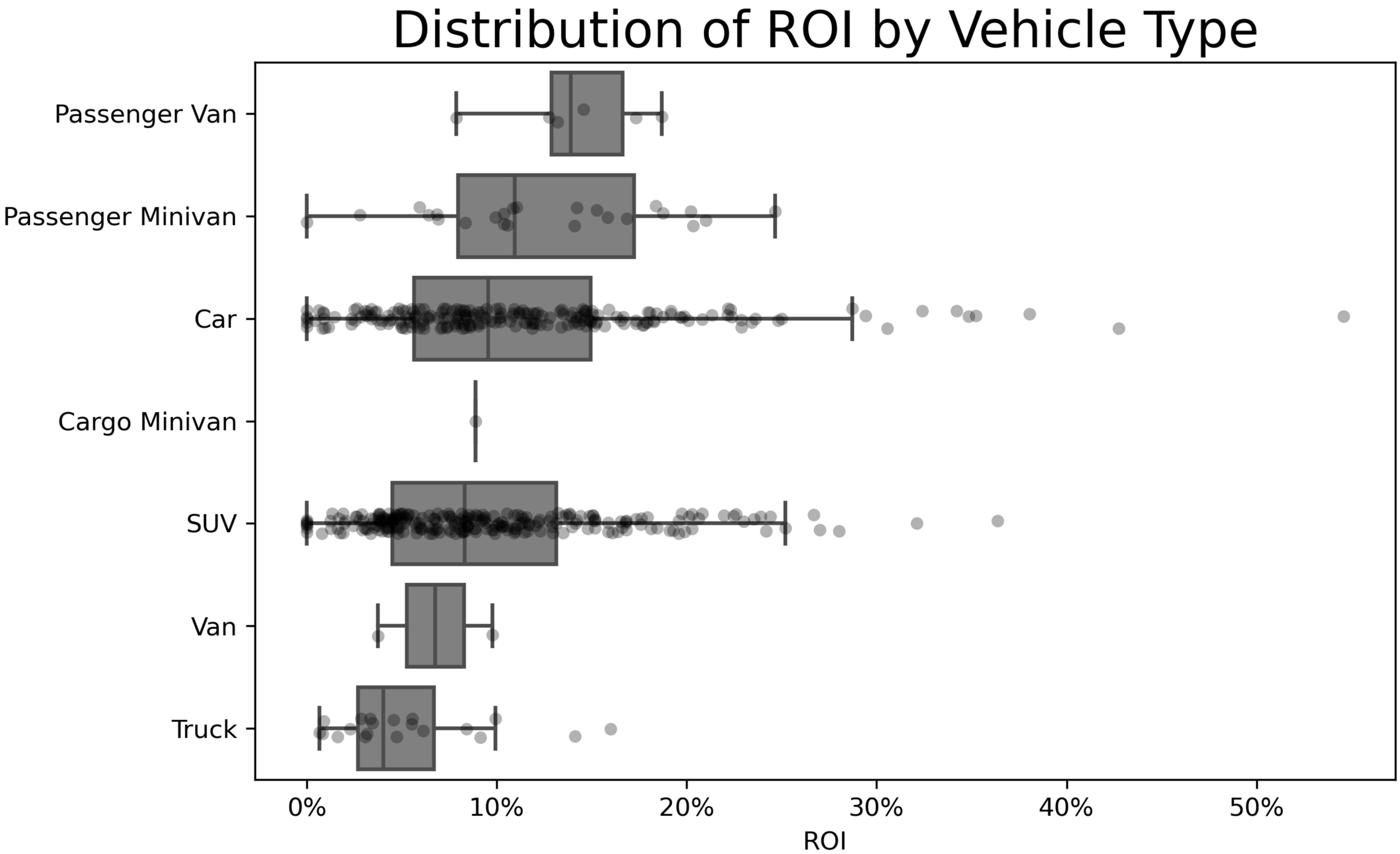
1. There is only one vehicle from 2010 – there is not enough data for this year to accurately estimate ROI.
2. The highest performing vehicles on the platform are 2015 and 2016 models.
3. The widest distribution is from 2016 models.

Which vehicle types are performing the best?



1. A visualization of ROI by type provides a high-level overview of which types of vehicles are popular for renters.

Diving deeper into vehicle type



1. The two types with the most vehicles are cars and SUVs.

2. There is only one cargo minivan, so there may not be sufficient data to accurately estimate ROI for this type.

3. Trucks general perform poorly.

4. Passenger Vans generally perform well.

Part Two: Statistical Tests

Part two of this project focuses on the following:

1. ***The Mann-Whitney U test*** was used to evaluate whether there is a significant difference in ROI for the following comparisons:

a) Hosts with multiple vehicles vs hosts with a single vehicle.

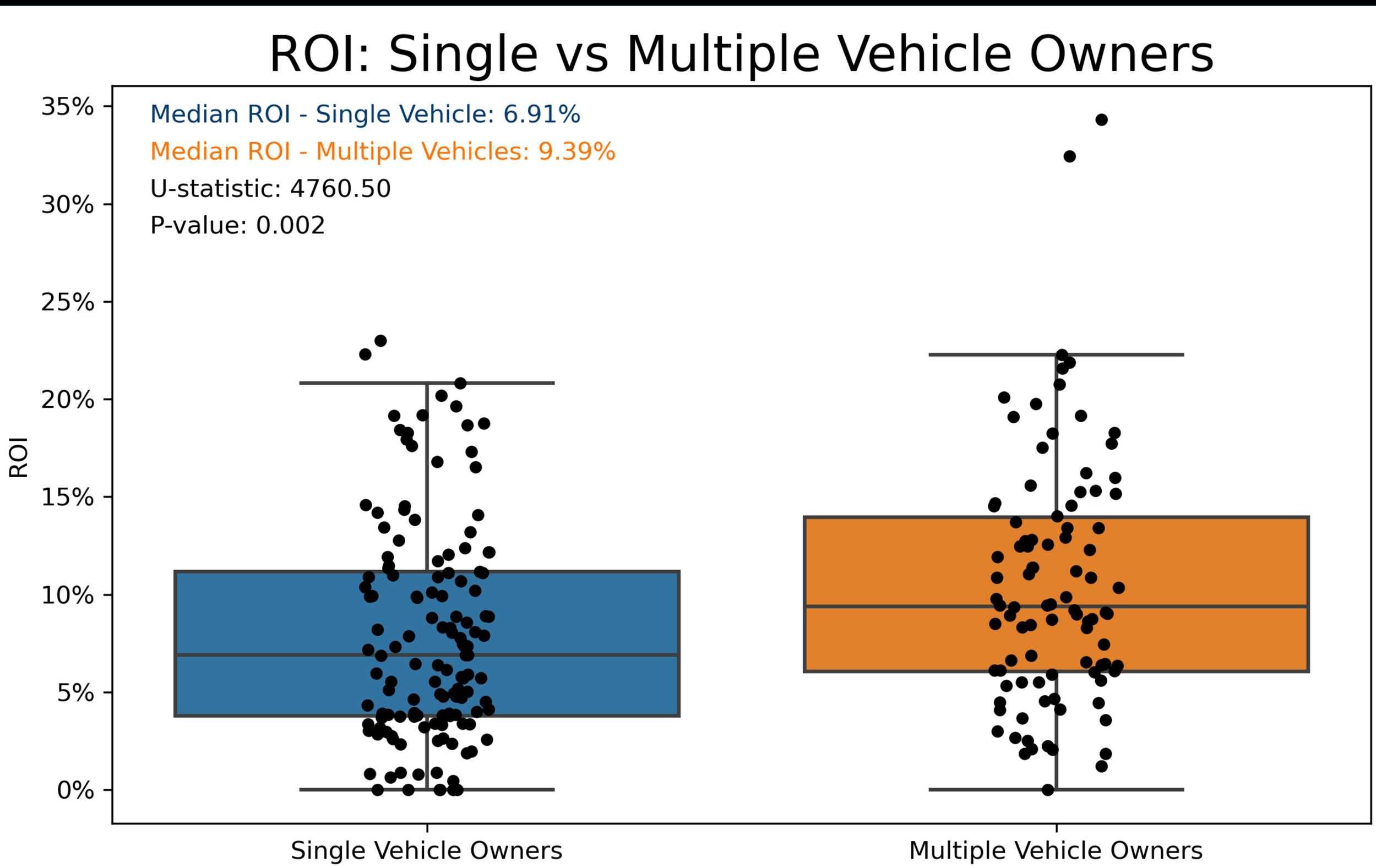
b) All-star hosts vs non-all-star hosts.

c) New listings vs old listings.

2. ***Locally Weighted Scatterplot Smoothing (LOWESS)*** was used to estimate the optimal daily rental price that maximizes ROI.

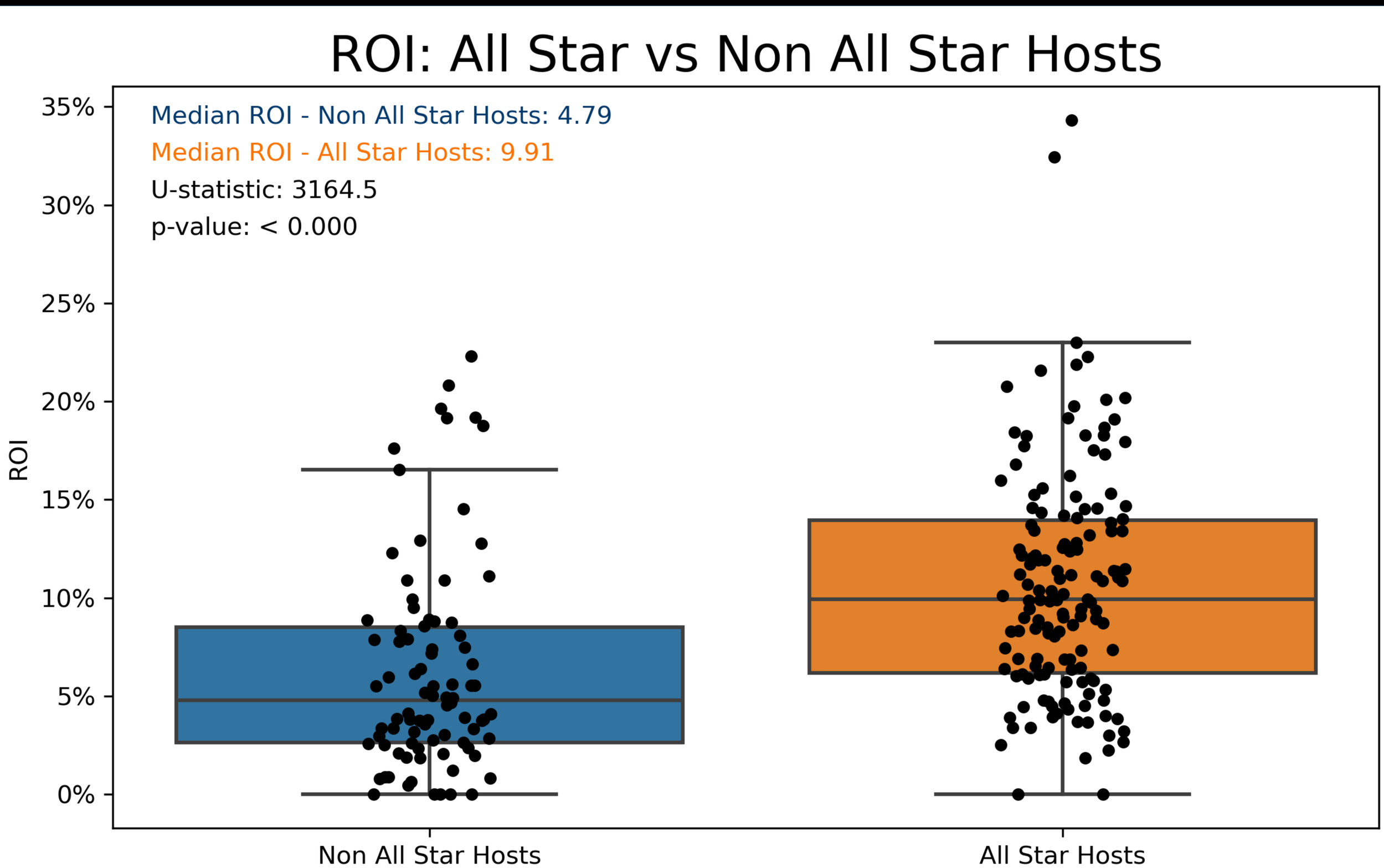
3. ***The Kruskal-Wallis Test (followed by Dunn's test)*** was used to assess differences in ROI across various vehicle price classes.

Are hosts with multiple vehicles more successful?



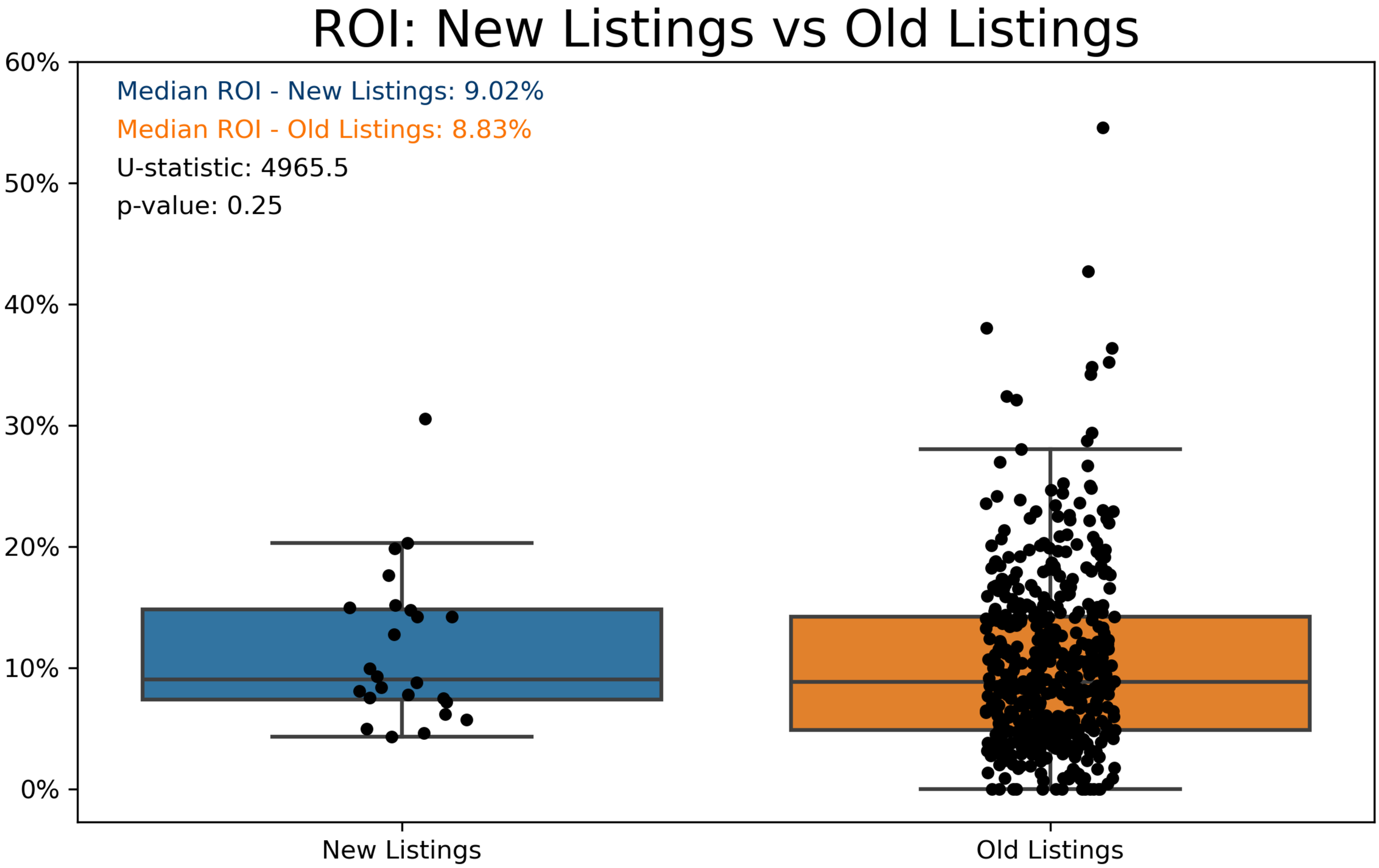
1. Hosts with multiple vehicles generally perform better on average compared to those with just one vehicle.

Are all star hosts more successful?



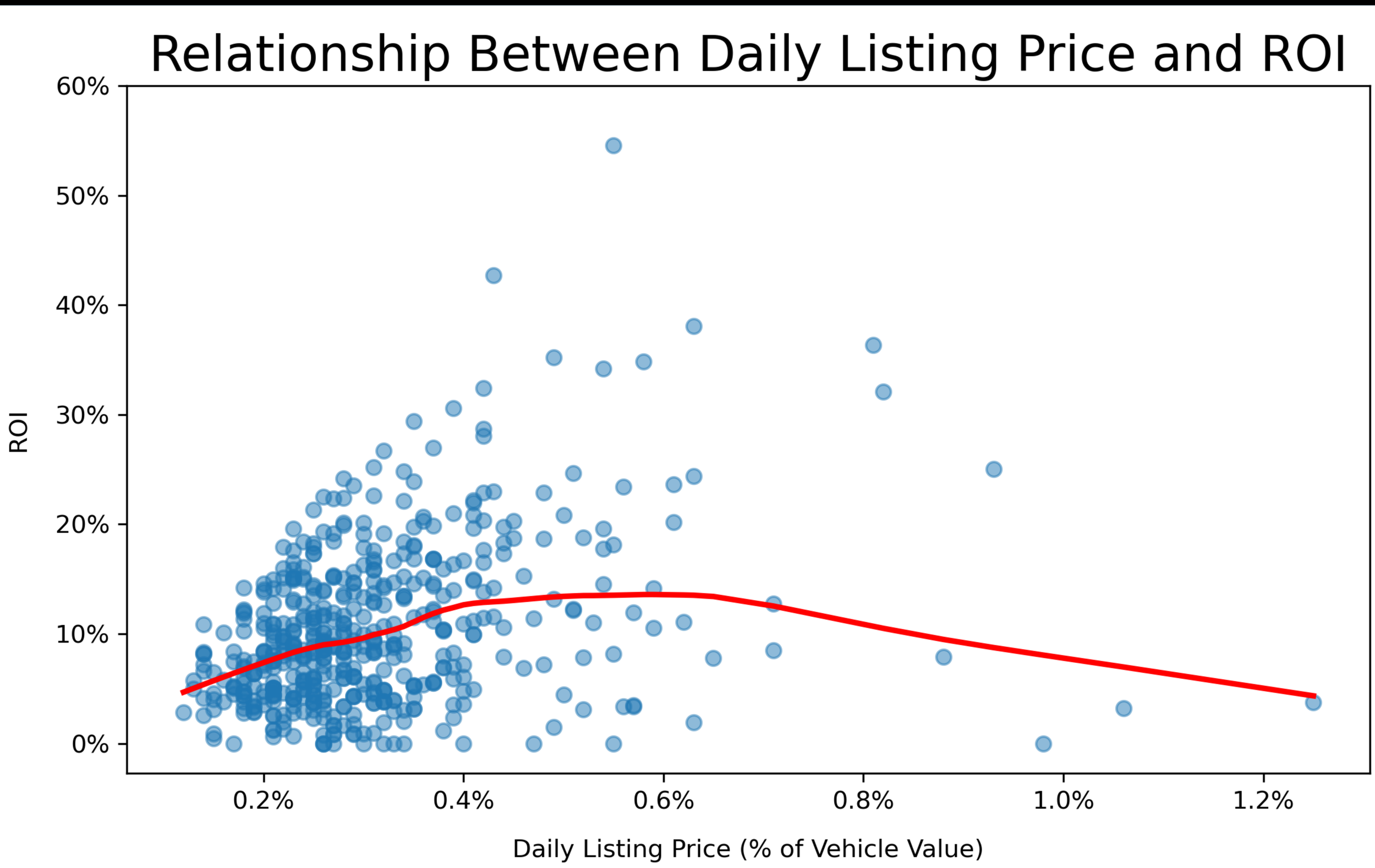
1. All Start Hosts generally perform better on average compared to Non-All-Star Hosts.

Do new listings get a boost from the Turo algorithm?



1. There is no statistically significant difference in performance between new listings and old listings.

What is the optimal daily rental price that maximizes ROI?

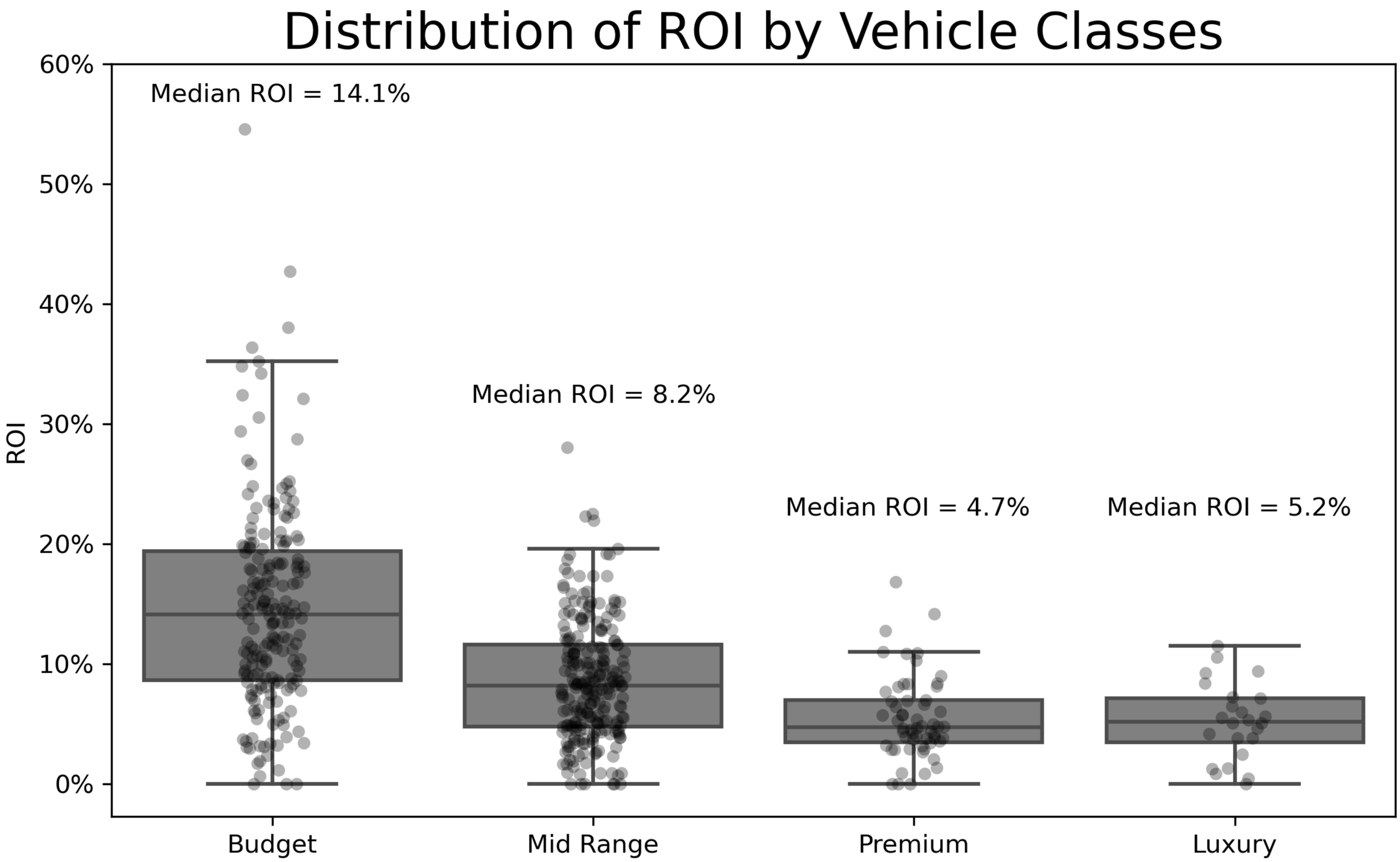


1. The x-axis shows the daily rental price as a percentage of the vehicle's value. For example, if a vehicle is worth $10,000 and the daily rental price is $50, the rental price would be 0.5% of the vehicle's value.

2. The peak of the red line indicates the daily listing price at which the ROI is highest.

3. The optimal daily rental price for a vehicle appears to be between 0.5% and 0.6% of its value.

Does the value of the vehicle matter?



1. **Vehicle Classification by Value:**
   a) **Budget:** Vehicles priced under $20,000
   b) **Mid-Range:** Vehicles priced between $20,000 and $40,000
   c) **Premium:** Vehicles priced between $40,000 and $60,000
   d) **Luxury:** Vehicles priced over $60,000

2. There are statistically significant differences among all the categories, except between the Premium and Luxury categories.

3. Vehicles that have a higher value, typically have a lower ROI

Top Vehicles - Budget Class

YEAR	MAKE	MODEL	Median ROI
2015	Nissan	Altima	42.7%
2016	Chevrolet	Cruze	39%
2016	Nissan	Versa Note	38.1%
2015	Nissan	Sentra	34.8%
2016	FIAT	500X	34.2%
2014	Nissan	Maxima	29.4%
2019	Nissan	Versa	28.7%
2017	Nissan	Rogue Sport	27%
2017	Hyundai	Tucson	29.7%
2013	Honda	Pilot	24.4%

Top Vehicles – Mid-Range Class

YEAR	MAKE	MODEL	Median ROI
2017	Dodge	Durango	28.3%
2019	Volkswagen	Tiguan	19.6%
2016	Mercedes-Benz	C-Class	19.5%
2020	BMW	X3	19.1%
2018	Ford	Transit	18%
2021	Nissan	Rogue Sport	17.9%
2021	Tesla	Model 3	17.3%
2022	Nissan	Pathfinder	16.6%
2019	Jaguar	F-PACE	16.4%
2017	Chevrolet	Colorado	16%

Summary and Recommendations

Findings:

1. Older models typically outperform newer models.
2. Vans and trucks do not perform well, and there is insufficient data to assess the performance of cargo minivans.
3. All-star hosts perform significantly better than non-all-star hosts.
4. Vehicles with a daily rental price between 0.5% and 0.6% of their value tend to maximize their ROI.
5. Budget vehicles perform better than any other class of vehicle.

Recommendations:

1. Consider purchasing a vehicle that is 7-10 years old.
2. Consider purchasing a passenger van, passenger minivan, car, or SUV.
3. Aim to meet the requirements to become an all-star host.
4. Set the daily rental price as 0.5% of the value of the vehicle.
5. Consider buying a vehicle that costs less than $20,000.