

# **Executive Summary**

## **Understanding the Drivers of Used Car Prices**

I analyzed over 100,000 unique used vehicles to determine which characteristics most strongly influence resale price. Using multiple regression models with cross validation, I identified consistent pricing drivers across brands, vehicle types, and conditions. While used vehicle pricing is inherently noisy and influenced by factors not captured in the dataset, the analysis reveals clear structural patterns that can help guide inventory acquisition and pricing strategy for used car dealerships.

### **Brand Matters**

Certain manufacturers consistently command strong price premiums, even after controlling for age and mileage. High-value brands include Tesla and Porsche, while certain lower-value brands such as Fiat, Saturn, and Mitsubishi tend to sell at discounts.

### **Condition and Title Status Drive Price**

Vehicle condition and title clarity are among the strongest drivers of resale price. Clean titles and vehicles in new or excellent condition command meaningful price premiums. Salvage titles, fair condition, or missing title information result in substantial discounts.

### **Vehicle Type Influences Demand**

Pickup trucks and diesel vehicles show notable price premiums relative to sedans and smaller vehicles.

### **Age and Mileage Depreciation**

Both vehicle age and mileage significantly reduce expected resale value. Each additional year of age and increase in mileage lowers expected price in a consistent and measurable way.

### **Model Performance and Reliability**

The selected Ridge regression model explains approximately 32 percent of observed price variation. Cross validation and test results were highly consistent, indicating that the model generalizes well to unseen vehicles. The model should be viewed as a pricing support tool rather than a replacement for expert market judgment.

## **Business Implications**

This analysis provides a structured framework for identifying high-margin vehicle categories, avoiding overpayment for historically discounted brands, quantifying expected depreciation, and supporting more consistent, data-driven acquisition decisions.

## **Final Recommendation**

Dealerships can use these findings to fine-tune inventory toward premium brands such as Tesla and Porsche, clean-title vehicles, high-demand vehicle types such as pickup trucks, and lower age and mileage inventory. Combining these insights with local market knowledge can make inventory decisions more consistent and ultimately more profitable.