

Deals On Wheels: let the market show you how to buy a better car

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Insight Data Science
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Resources available to car buyers have serious limitations

The logo for Business Insider, consisting of the words "BUSINESS" and "INSIDER" stacked vertically in a bold, serif font.

BUSINESS
INSIDER

The 7 best used cars to buy

Steven John May 4, 2019, 7:03 AM

Online publications

Resources available to car buyers have serious limitations

BUSINESS
INSIDER

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Online publications



KELLEY BLUE BOOK OFFICIAL GUIDE

Private Party \$4,116

edmunds

Private Party \$1,597

A graphic showing a silver Honda Civic sedan from a side profile. Below it is the Kelley Blue Book logo. To the right is the Edmunds logo with a blue car icon. Two boxes below show 'Private Party' prices: \$4,116 and \$1,597, with arrows pointing from the respective text to the Kelley Blue Book and Edmunds logos.

Vehicle valuation tools

Deals On Wheels

Let the market show you how to buy a better car

www.DealsOnWheels.live



Actionable
recommendations

Online publications



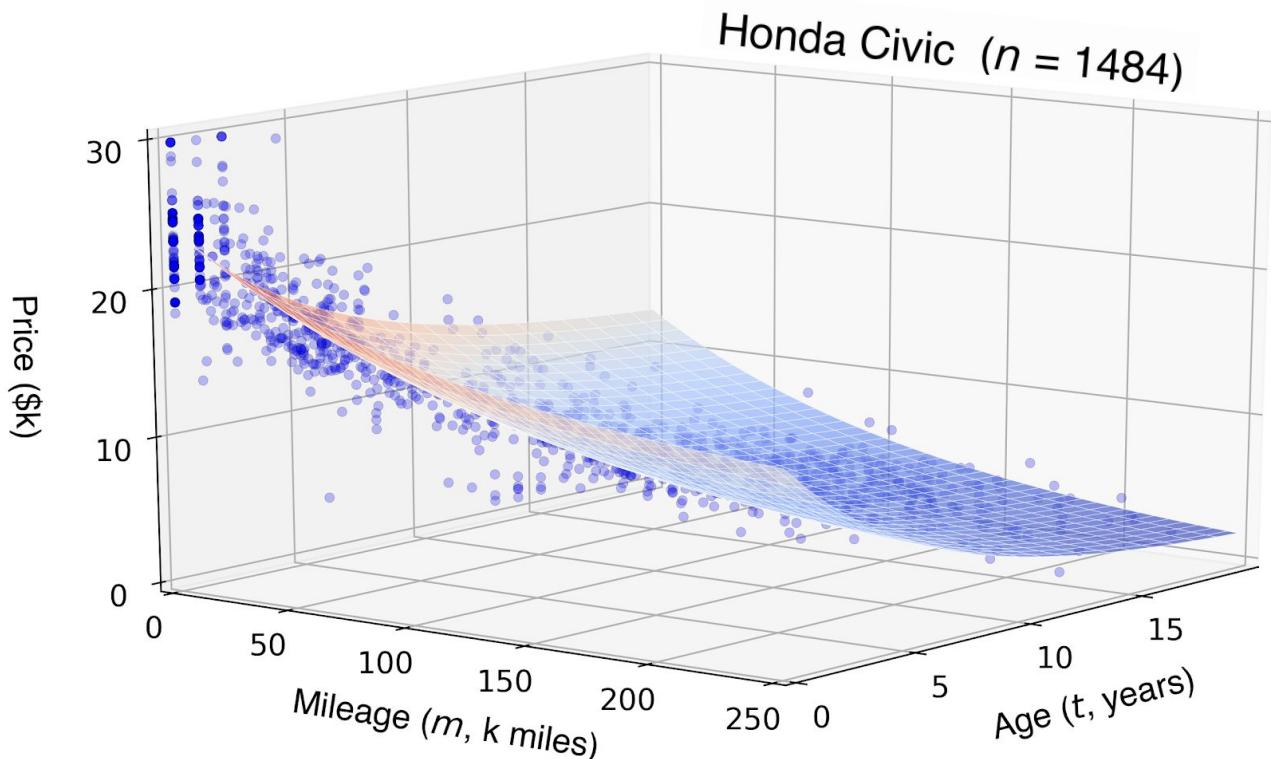
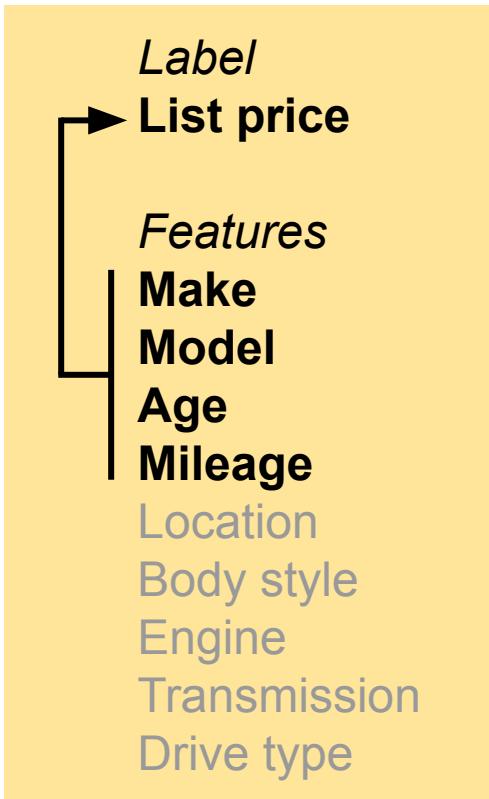
Quantitative info
on all available cars

Vehicle valuation tools

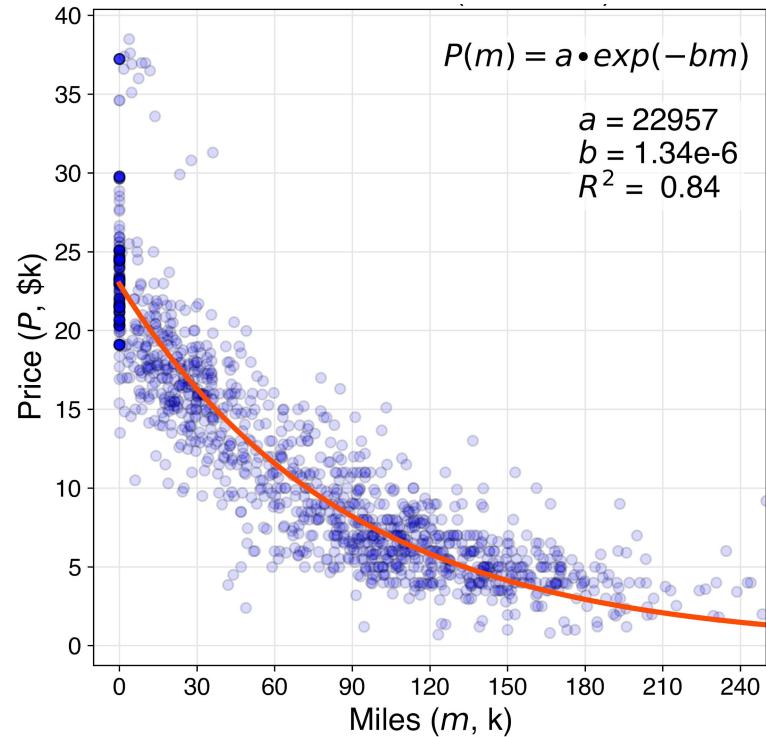
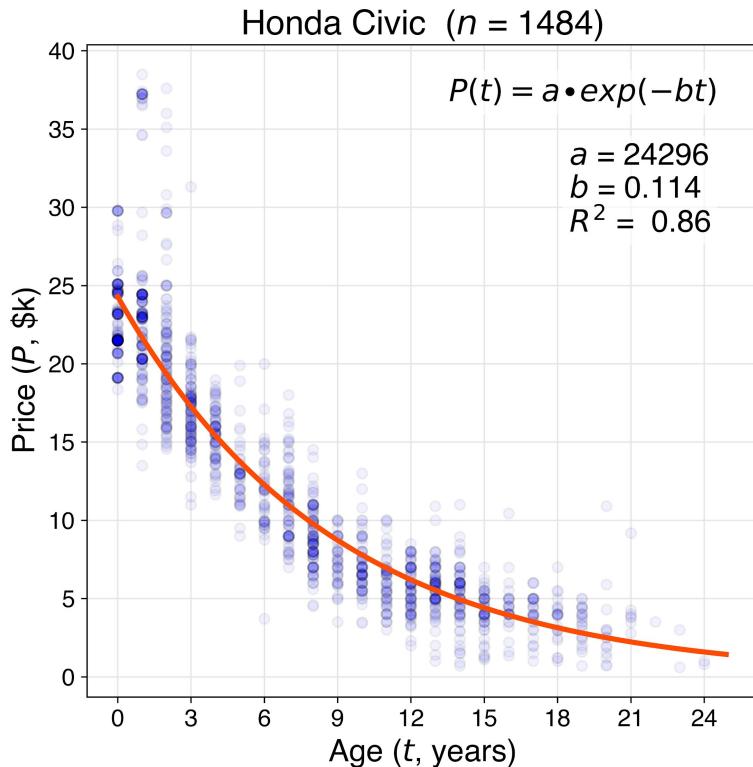
Data: scraped 100,000 current listings from 5 major metro areas



Car age and miles as predictors of list price

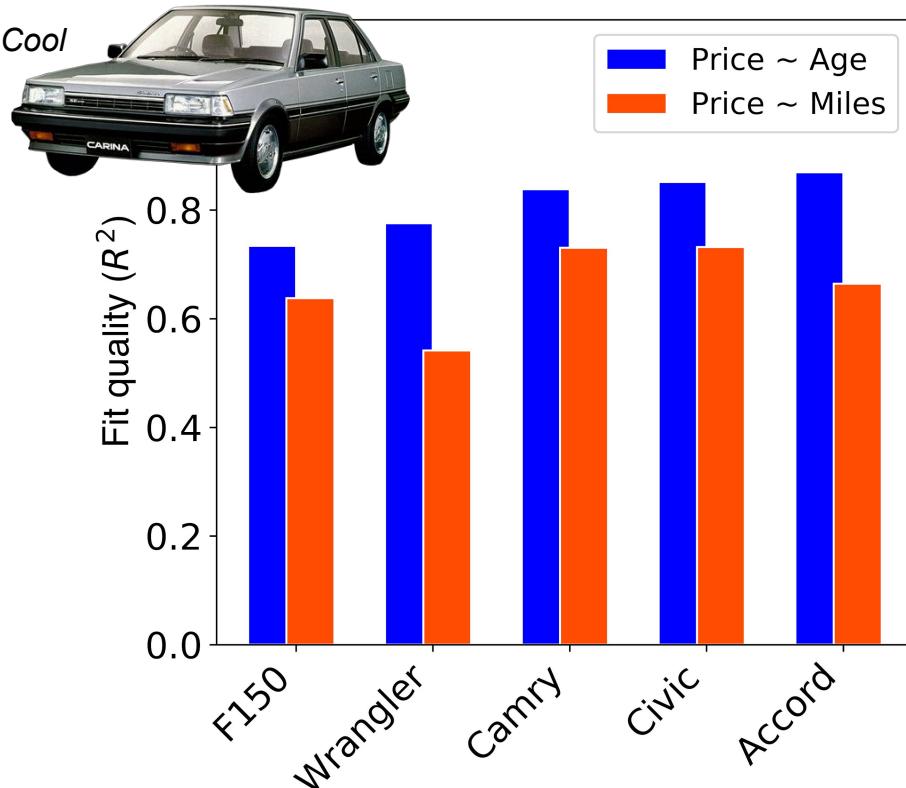


Age is better predictor of price than miles

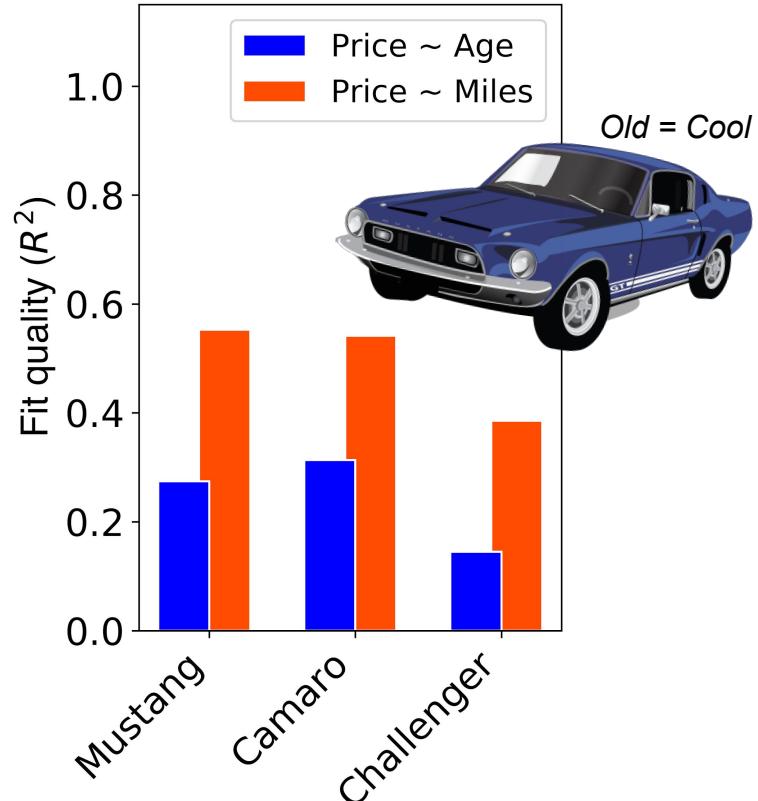


...but it's inverted for cars with vintage appeal

Old ≠ Cool



Old = Cool

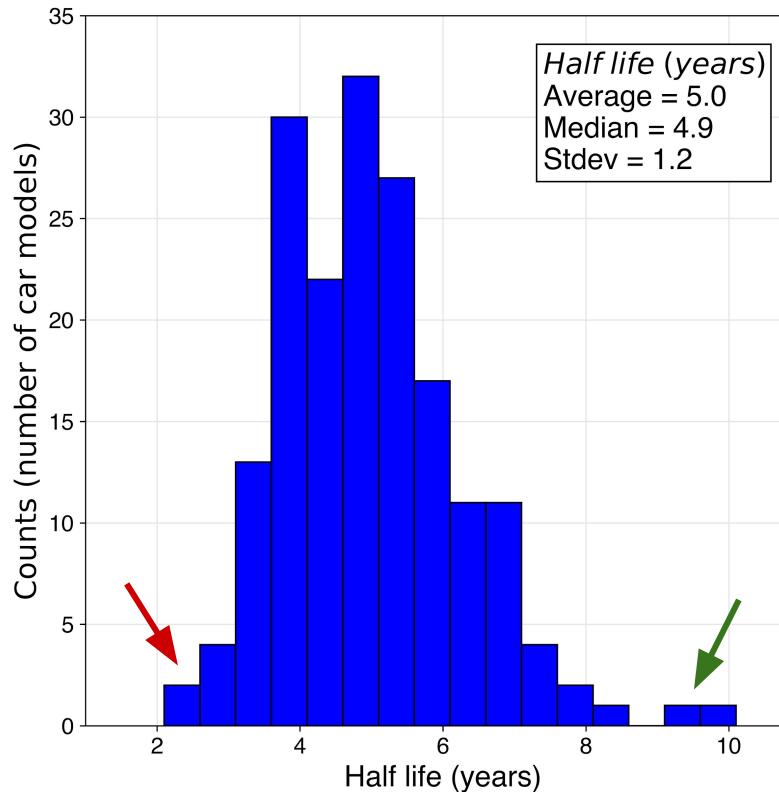


Worst and best: outliers in value retention

Nissan Leaf
(2.1 years)



Porsche Panamera
(2.8 years)



Jeep Wrangler
(8.3 years)



Mazda Miata
(9.7 years)

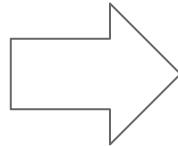


Deals On Wheels for an informed car purchase

I need to buy a car



I like the ____.
Maybe I'll get it?



Deals On Wheels

User input

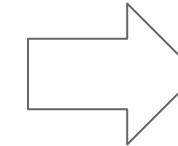


Half life: 3.7 years

Recommended alternative



Half life: 7.0 years



Purchase decision

Original choice

- Already rich
- Strong preference

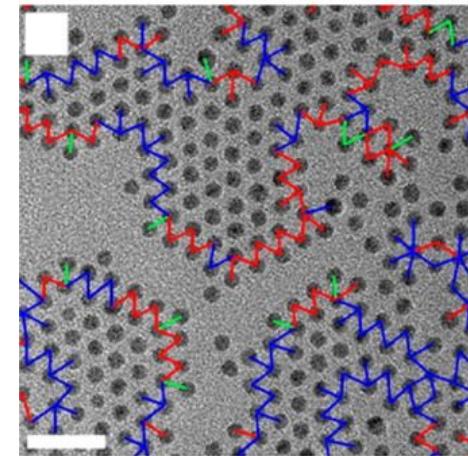
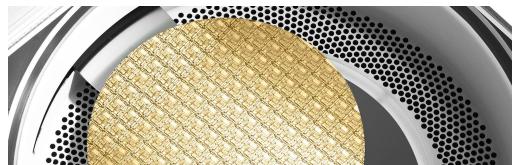
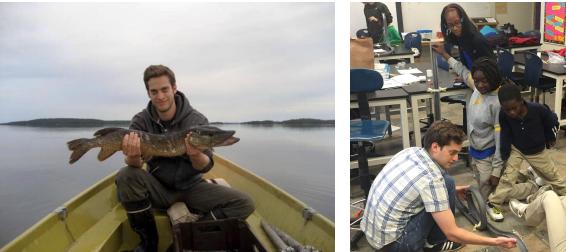
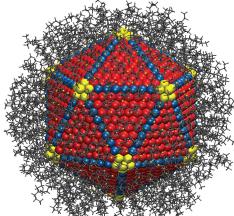
Deals on Wheels recommendation

- Budget conscious
- Flexible choice

Michael Boles



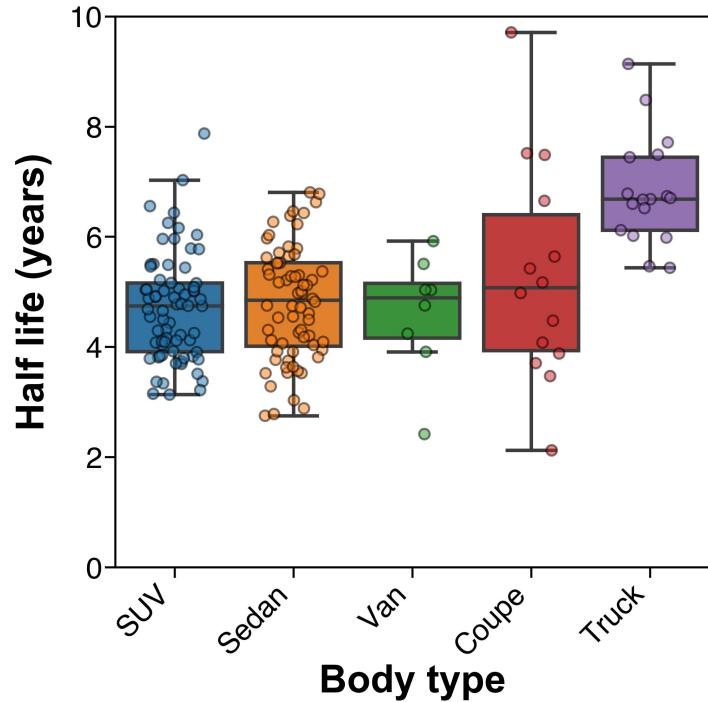
Chemistry
B.S.
Ph.D.
Postdoc



Process engineer

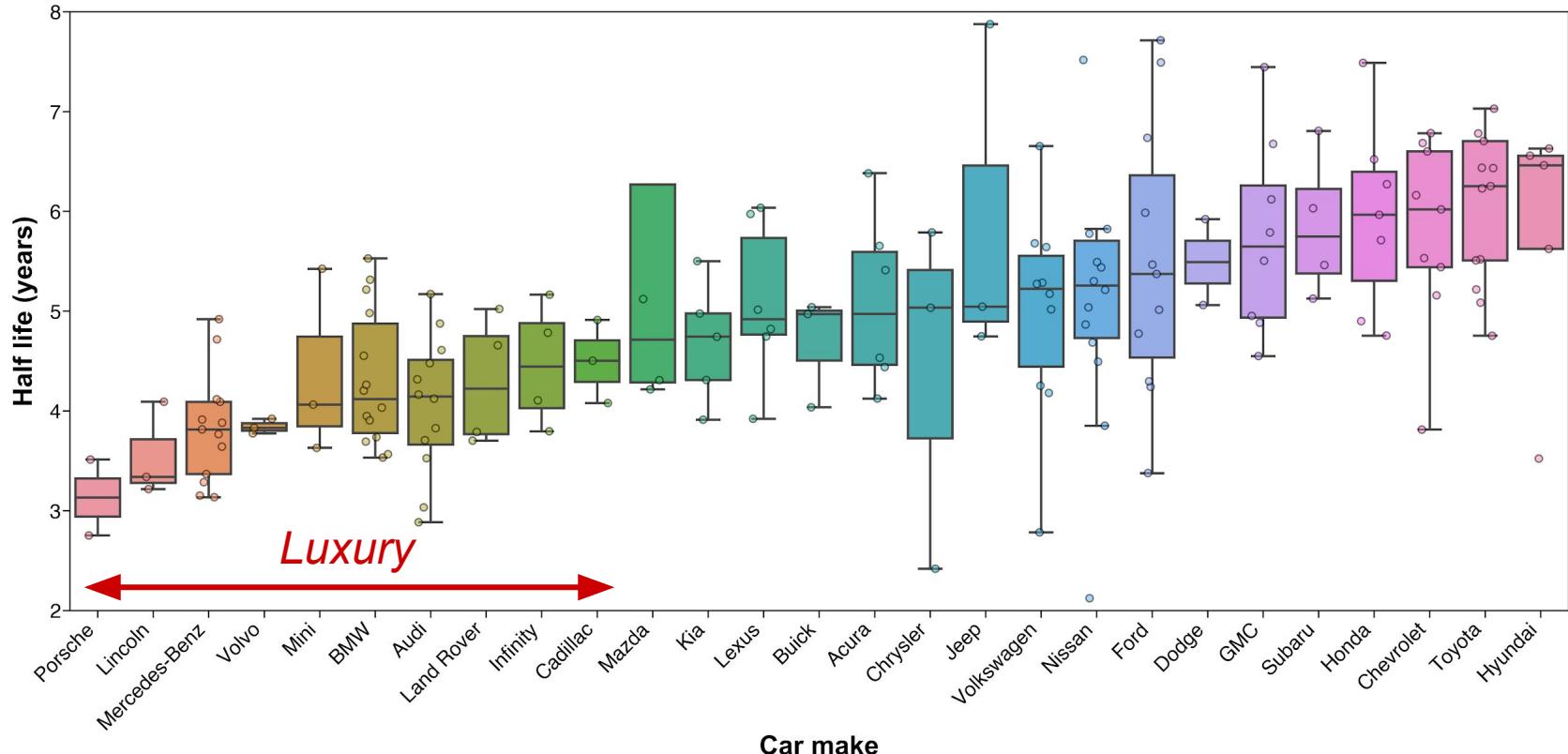
End

Trucks retain value better than other segments

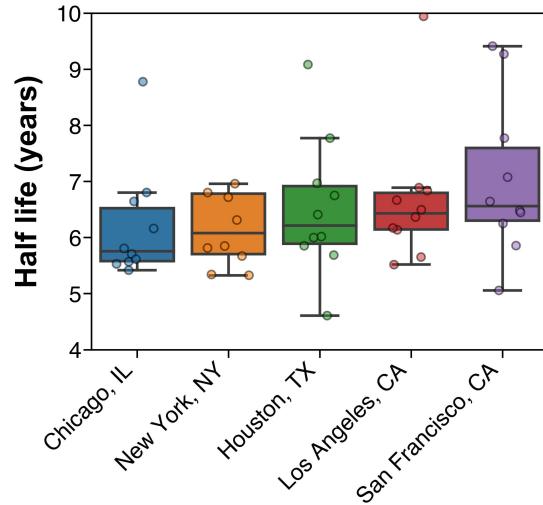
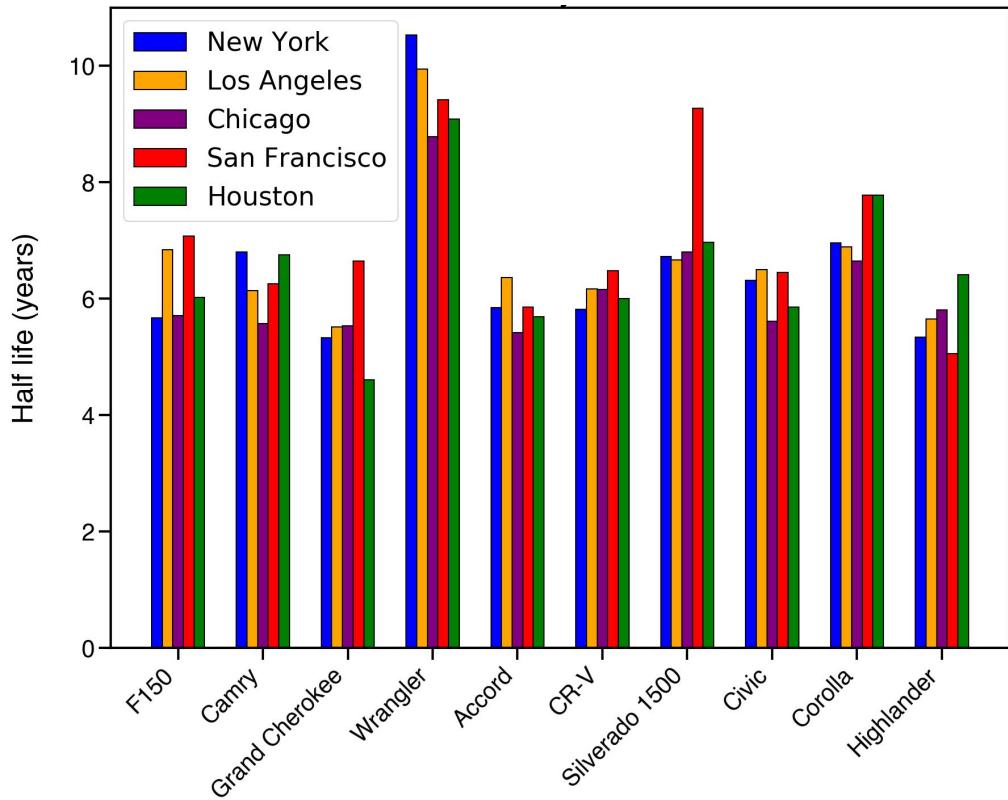


Utility > *Aesthetics, technology, etc.*

Luxury brands lose value faster than others



Weather impacts vehicle value retention

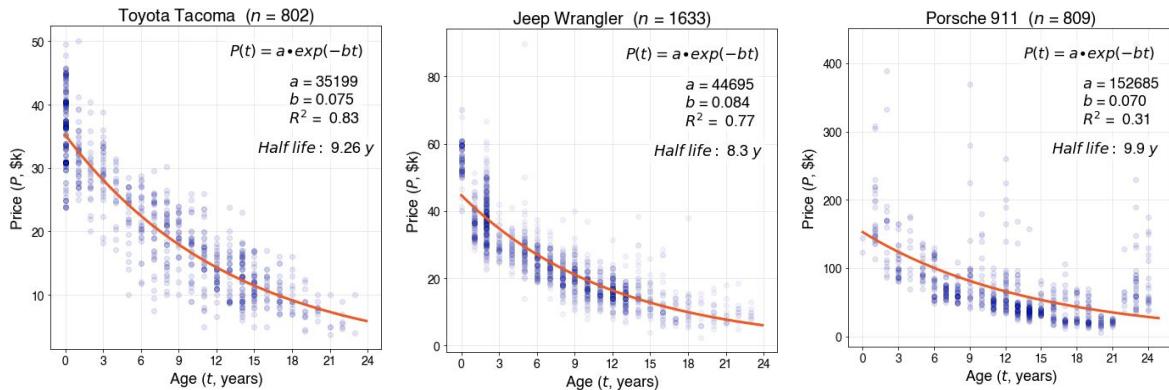


Increasing
seasonal
temperature
variation

Validation: best, worst cars for value retention

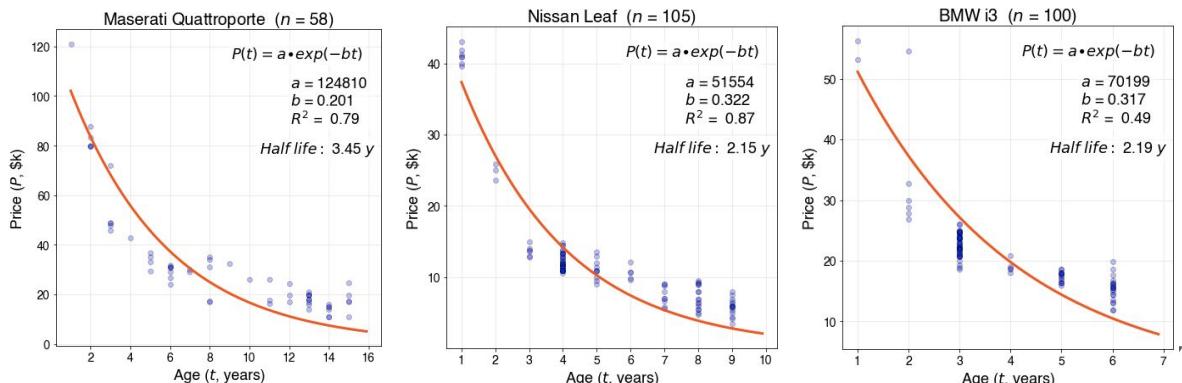
Top 10 Vehicles Having The Lowest Five-Year Depreciation:

1. Jeep Wrangler (off-road SUV): 30 percent
2. Jeep Wrangler Unlimited (off-road SUV): 31.5 percent
3. Toyota Tacoma (midsize pickup): 32.0 percent
4. Toyota Tundra (full-size pickup): 35.9 percent
5. Toyota 4Runner (midsize truck-based SUV): 36.5 percent
6. Porsche 911 (sports car): 37.2 percent
7. Honda Ridgeline (midsize pickup): 38.1 percent
8. Nissan GT-R (sports car): 39.4 percent
9. Nissan Frontier (midsize pickup): 39.5 percent
10. Subaru WRX (sports car): 40.0 percent



Top 10 Vehicles Having The Highest Five-Year Depreciation:

1. Maserati Quattroporte (luxury car): 72.2 percent
2. BMW 7 Series (luxury car): 71.3 percent
3. Nissan Leaf (electric car): 71.0 percent
4. BMW i3 (electric car): 70.9 percent
5. BMW 5 Series (luxury car): 69.2 percent
6. Acura RLX (luxury car): 69.2 percent
7. Ford Fusion Energi (plug-in hybrid): 69.1 percent
8. BMW 6 Series (luxury car): 69.0 percent
9. Jaguar XJL (luxury car): 68.9 percent
10. Chevrolet Volt (range-extending electric car): 68.1 percent



Average car is driven 11k miles per year

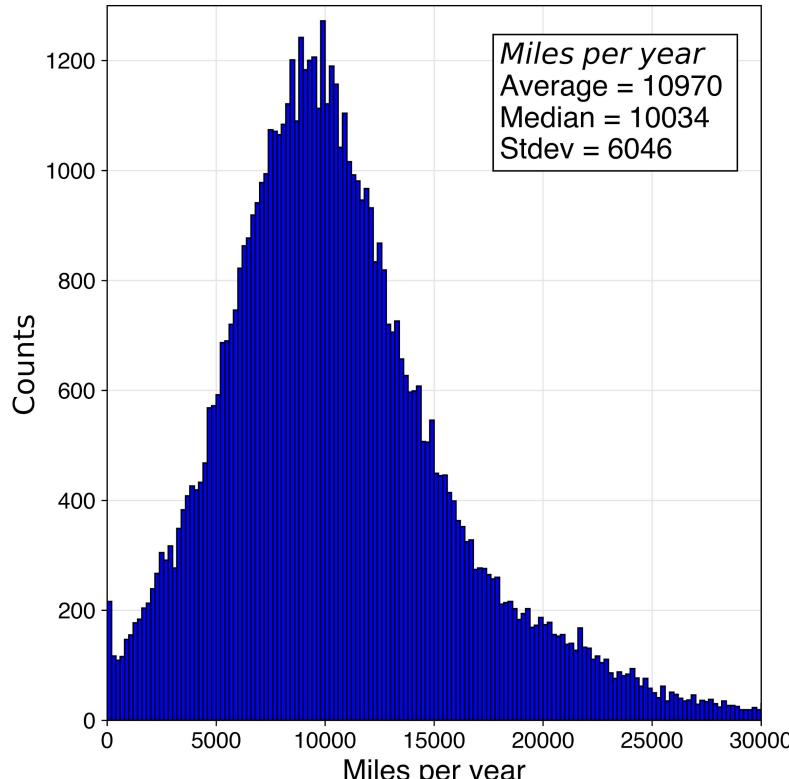
Conventional wisdom

- 12k miles/year

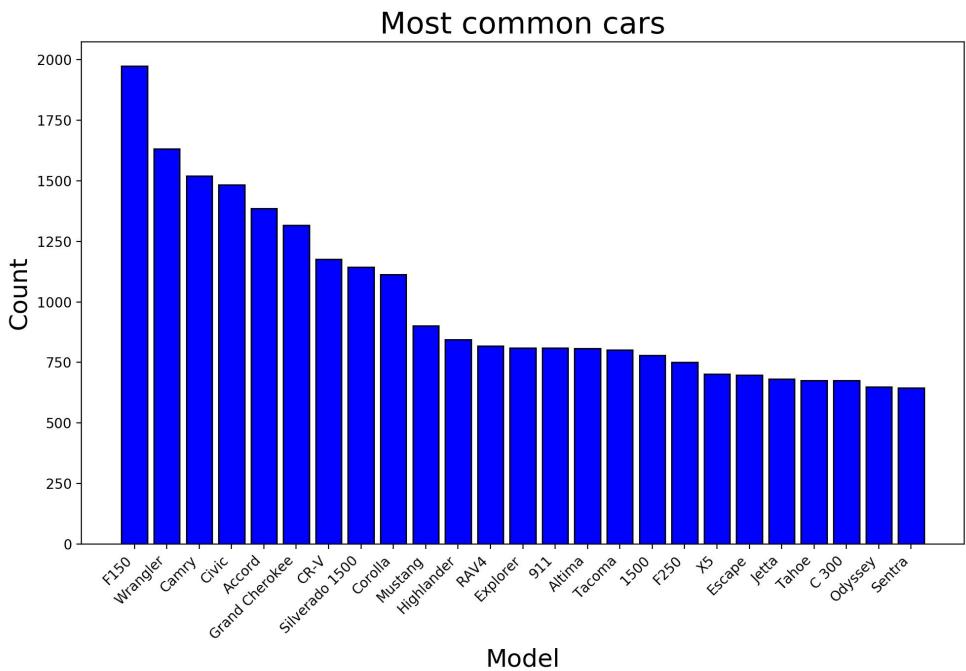
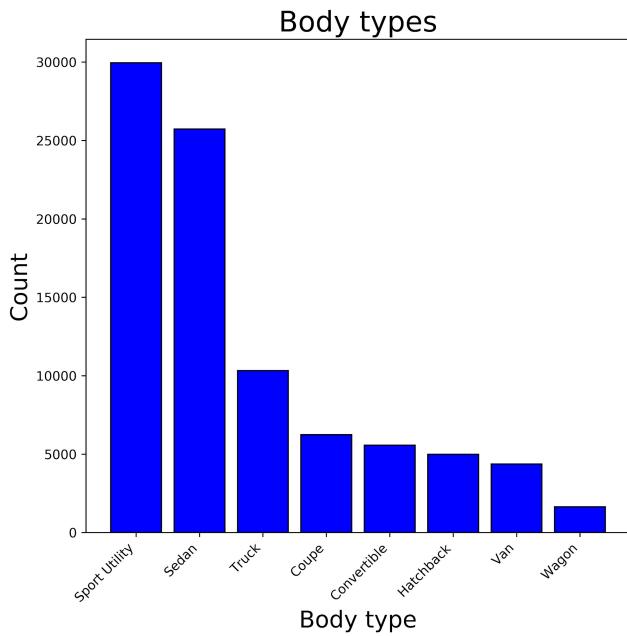
This data set

- 11k miles/year

Google search results for "miles per year on car average". The search bar shows the query. Below it, a snippet from Wikipedia states: "An average of 12,000 miles per year is considered the norm." Other search filters like All, News, Images, Videos, Maps, etc., are visible.



Most common body style and models



Price vs. time across models, fit depreciation

Autotrader



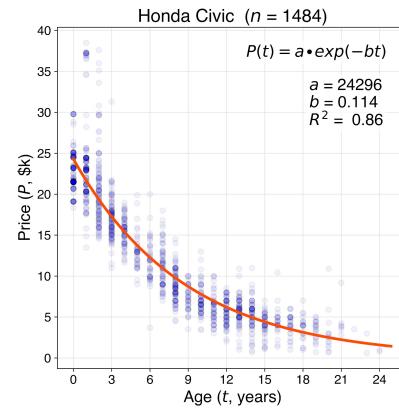
100,000 listings
59 car makes
1024 models



Features

Make
Model
Year
Mileage
Body
Location
Color
Drive
Transmission
Engine

Label
Price



Fit empirical
depreciation
curves by model

Filter: $R^2 > 0.75$

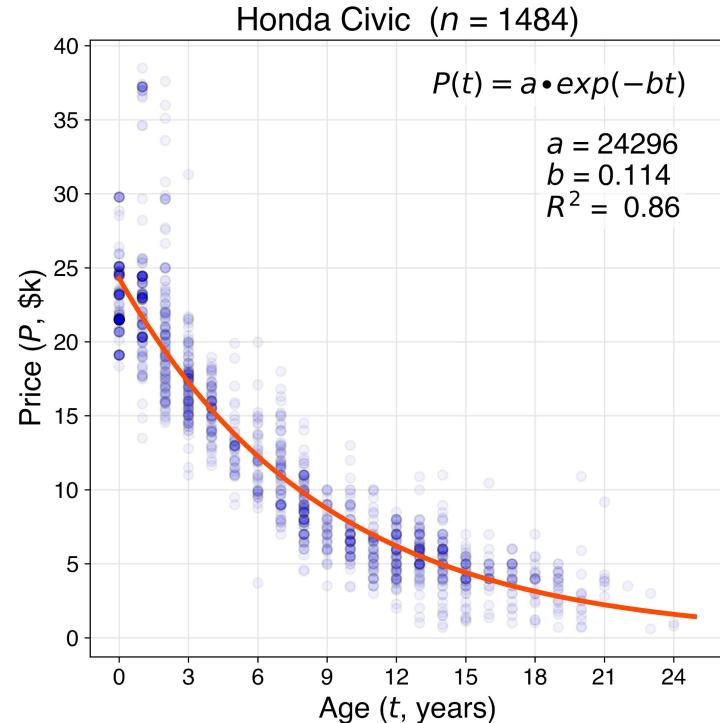
Univariate modeling of depreciation rates

Conventional wisdom

- 24% per year in first year
- 15% per year after that

Tested

- Conventional wisdom
- Exponential decay
 - Price vs. Age
 - Price vs. Mileage



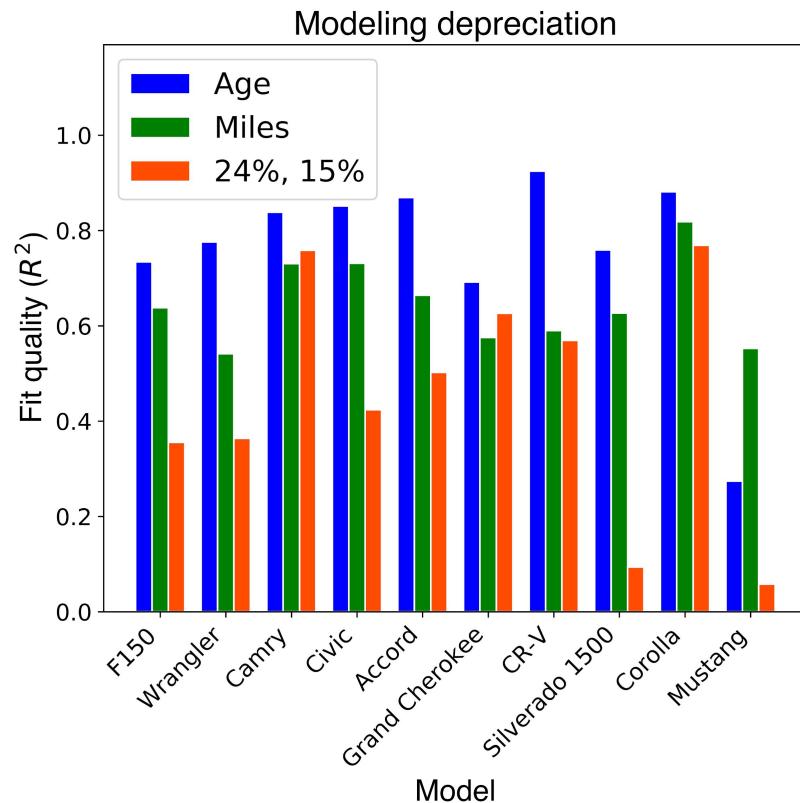
Univariate modeling of depreciation rates

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Tested

- Conventional wisdom
- **Exponential decay**
 - **Price vs. Age**
 - Price vs. Mileage



Next steps: offer recommendations to model-agnostic user with given body style and price range preferences

Current offering

Input (car)

- Make
- Model

Output

- Depreciation summary
- Recommended alternatives

Next iteration

Input

(body style)

- SUV
- Sedan
- Truck
- Coupe
- Van

Output

- Recommendations

Input

(price range)

- Lower limit
- Upper limit

Valuation:

