Predicting Rental Prices

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What is Turo?

- Peer to peer car sharing
- “AirBNB for cars”
- Flexibility and options
- Huge variety of vehicles

Motivation

- Gain a better understanding of pricing influences
  - Owners: Maximize their earnings
  - Renters: Recognize value
  - Turo: Enhance price suggestion tools

Data Sources

- Random Sampling of 2,784 Vehicles
- Turo Data
- Motortrend Vehicle Valuations

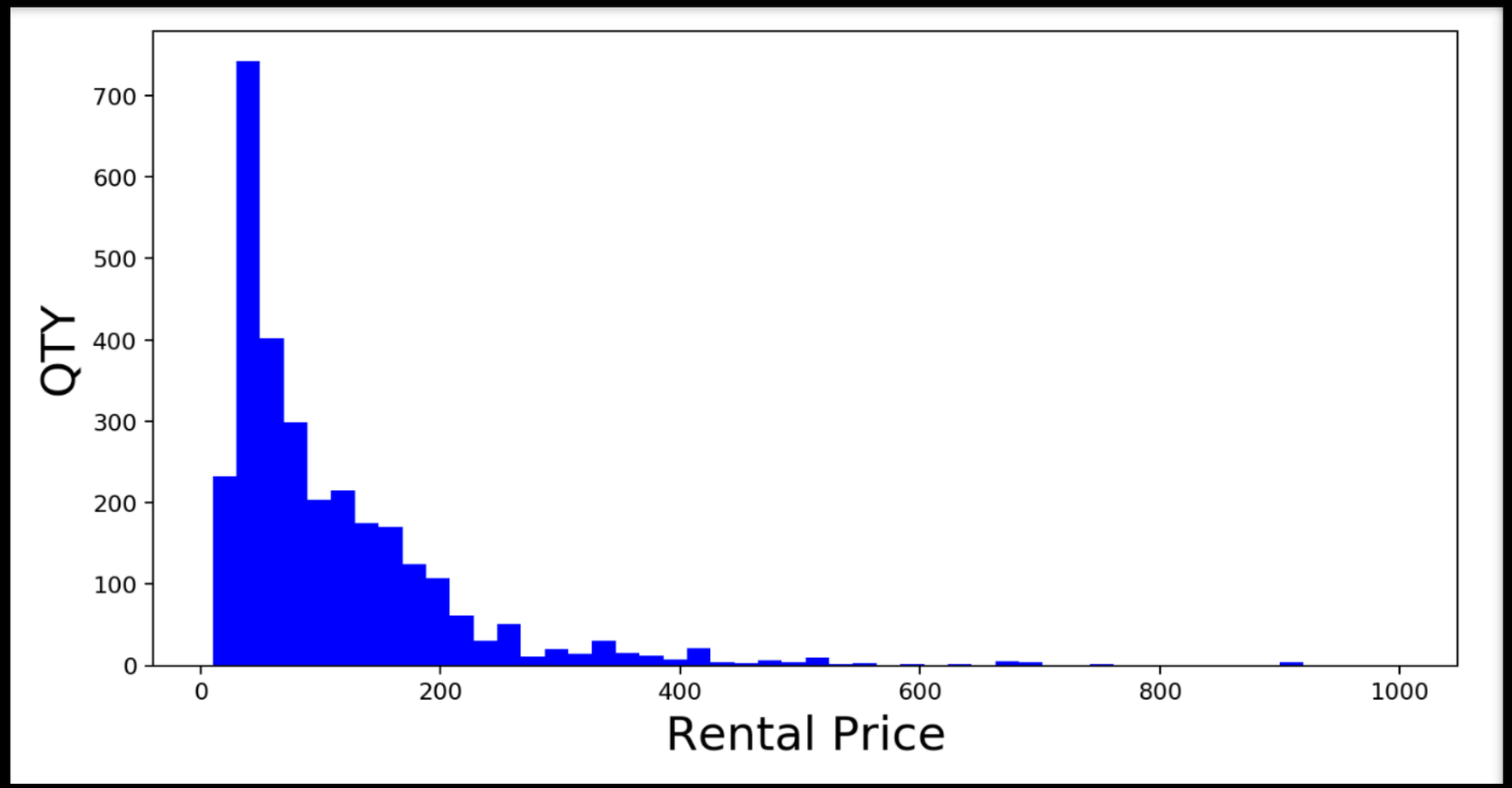
Data Features to Predict Price

- Business Class
- Distance from Airport
- Free delivery
- Instant Booking
- Vehicle Type
- # of Trips
- # of Reviews
- Vehicle Age
- Purchase Value
- Transmission

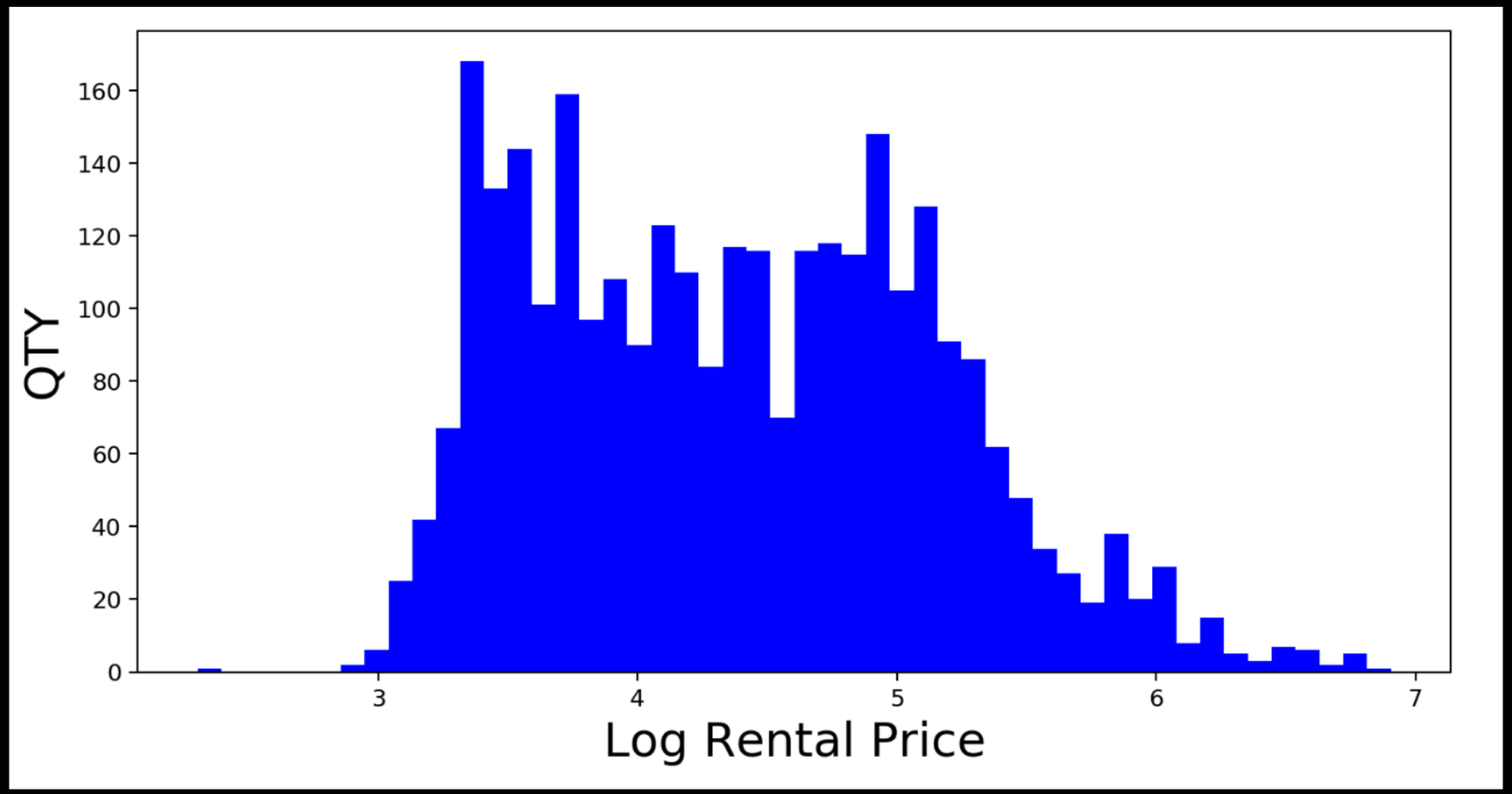
Model Design

- Linear regression
- Normalized Response Variable
- Cross - Validation (10 fold)
- Optimized Complexity

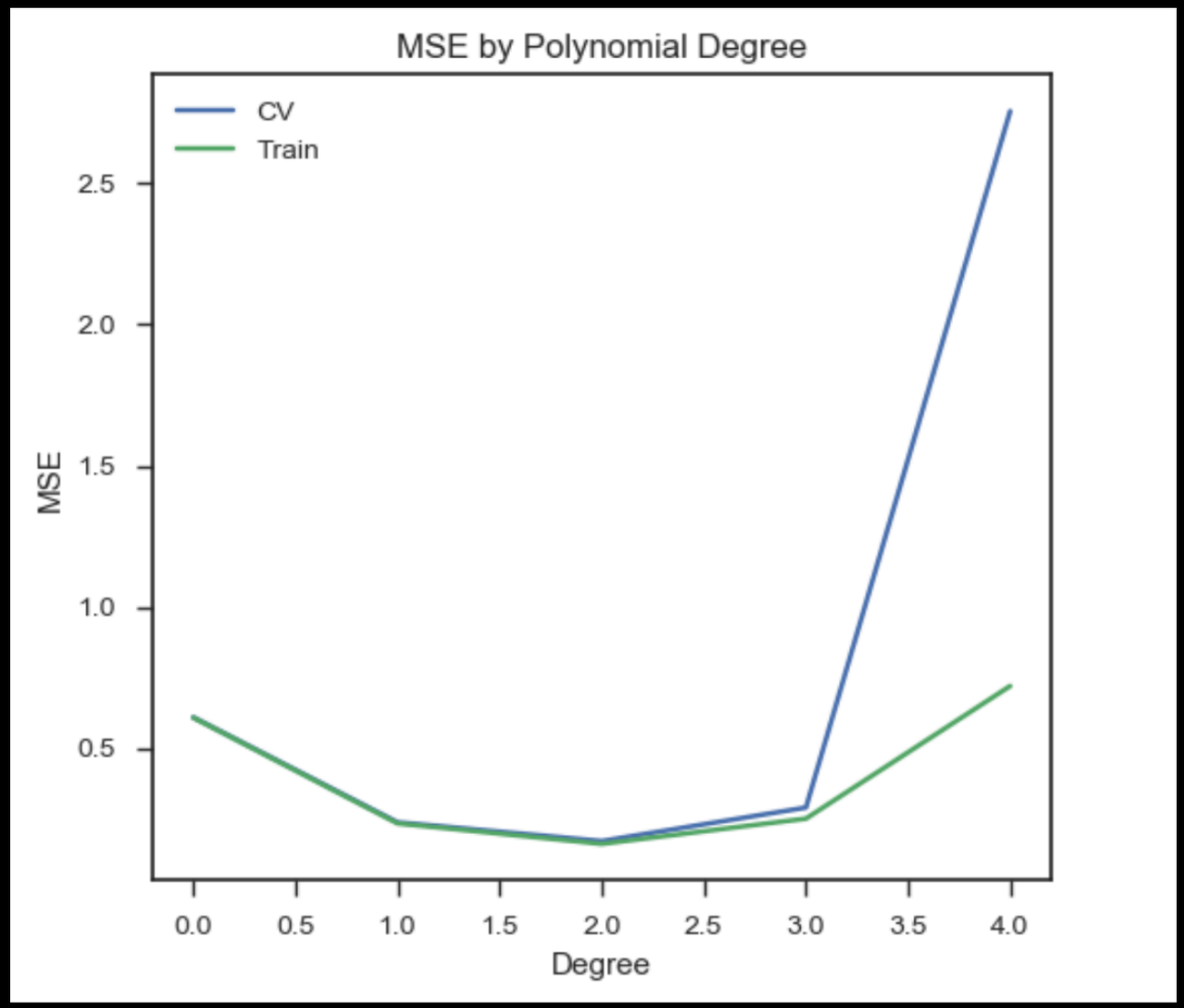
Rental Prices
Not Normally Distributed



Transform Response Variable To Log of Price



Model complexity tested for underfitting / overfitting



Actual Response vs Predicted Response

Model Key Performance Indicators

$$Mean of R^2 = 0.613$$

Model explains 61% of the variability

$$Mean of MSE = 0.251$$

Average variability of model

Sample Fits of Randomly Selected Vehicles

2014 Chevy Silverado

Actual Price: $106

Model Fit: $88.36

Comment: Trucks fit the model well

2016 Dodge Caravan

Actual Price: $70.37
Model Fit: $50
Comment: Less exciting vehicles= lower price

2016 Tesla Model X

Actual Price: $316
Model Fit: $213.41
Comment: Exotic vehicles = poor fit / outlier

2016 Ford Fusion

Actual Price: $72

Model Fit: $62.20

Comment:

Standard vehicles fit well

Thank You

Questions?

Appendix

OLS Regression Results

Dep. Variable:	log_price	**R-squared:**	0.595
Model:	OLS	**Adj. R-squared:**	0.593
Method:	Least Squares	**F-statistic:**	406.6
Date:	Fri, 12 Oct 2018	**Prob (F-statistic):**	0.00
Time:	06:06:40	**Log-Likelihood:**	-2004.8
No. Observations:	2784	**AIC:**	4032.
Df Residuals:	2773	**BIC:**	4097.
Df Model:	10		
Covariance Type:	nonrobust		

Omnibus:	131.902	**Durbin-Watson:**	1.555
Prob(Omnibus):	0.000	**Jarque-Bera (JB):**	201.698
Skew:	0.416	**Prob(JB):**	1.59e-44
Kurtosis:	4.023	**Cond. No.**	3.27e+05

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	3.7949	0.059	64.799	0.000	3.680	3.910
frDvy[T.True]	0.0287	0.022	1.306	0.191	-0.014	0.072
AT[T.True]	-0.1509	0.055	-2.756	0.006	-0.258	-0.044
trips	-0.0084	0.001	-8.796	0.000	-0.010	-0.006
trips_sq	5.111e-05	8.43e-06	6.065	0.000	3.46e-05	6.76e-05
age	-0.0117	0.011	-1.117	0.264	-0.032	0.009
age_sq	0.0021	0.001	1.769	0.077	-0.000	0.004
sold	2.494e-05	4.88e-07	51.093	0.000	2.4e-05	2.59e-05
type_minivan	-0.0818	0.084	-0.974	0.330	-0.247	0.083
type_suv	0.1549	0.023	6.753	0.000	0.110	0.200
type_truck	0.3359	0.070	4.777	0.000	0.198	0.474

False