

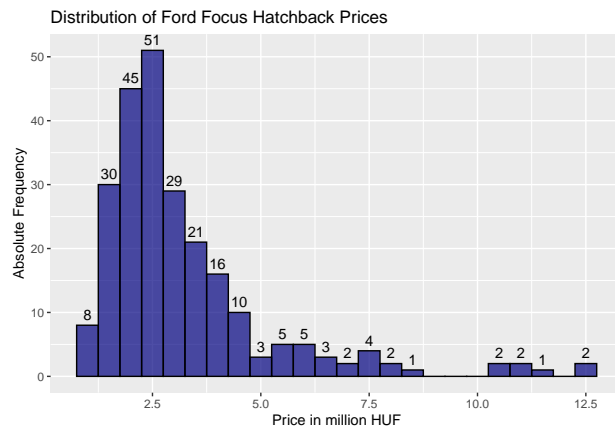
Chapter 8 - Data Exercise 5

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Price distribution of Ford Focus cars

The histogram shows the absolute frequency of less than 10 years old Ford Focus Hatchback prices (in million HUF) with 0.5 million HUF bins. As we can see the distribution is skewed with a right tail. The reason of the skewness are seven extreme values above 10 million HUF (see the observations below in table). These observations are not errors, the cars are Ford Focus RS cars, which are very expensive due to their high performance above 350 HP and their extravagant outlook, thus I decided to exclude the 8 RS cars as their pricing is special and will make the fit of the regression worse.



Removing extreme values

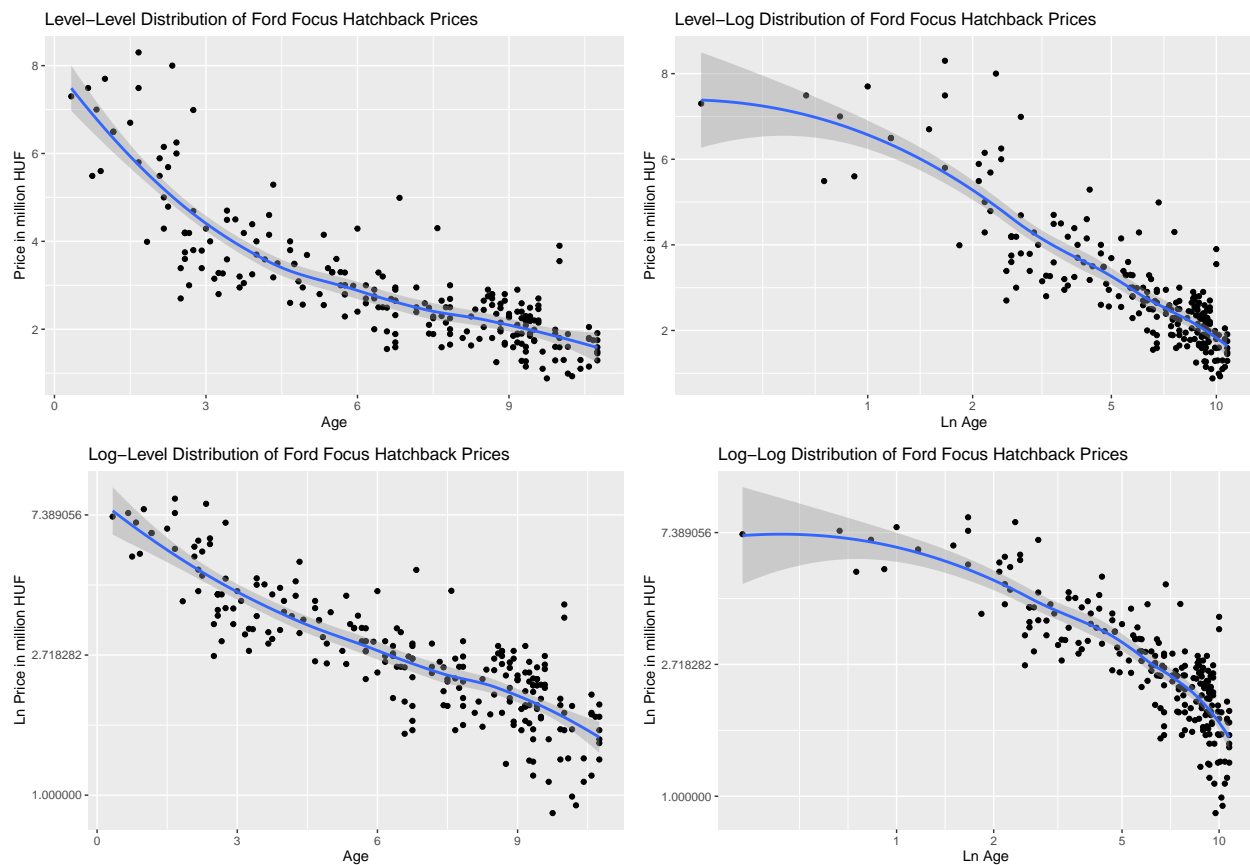
Table 1: Extreme values in Ford Focus Price distribution - Ford Focus Rs

| ID | Name | Price_mHUF | RegistrationYear | Kilometer | Performance_HP |
|-----|---------------------------------------------------------------------------------------------------------------------|------------|------------------|-----------|----------------|
| 345 | FORD FOCUS 2.3 EcoBoost RS AWD S S ÁFA-s átadási ár | 12.69 | 2017 | 61350 | 349 |
| 346 | FORD FOCUS 2.3 EcoBoost RS+ AWD S S RajtA 4Mod 350le | 12.49 | 2018 | 20500 | 349 |
| 347 | FORD FOCUS 2.3 EcoBoost RS AWD S S ÁFA-S ÁR. FULL EXTRA. NAVI. RECARO BŐR. ÜLÉS ÉS KORMÁNYFÜTÉS. TÁBLAFELISMERŐ. TO | 11.39 | 2018 | 23924 | 349 |
| 348 | FORD FOCUS 2.3 EcoBoost RS+ AWD S S WOLF TUNING 400PS VOLL | 10.99 | 2016 | 34000 | 402 |
| 349 | FORD FOCUS 2.3 EcoBoost RS AWD S S | 10.90 | 2017 | 20300 | 349 |

| ID | Name | Price_m_HUF | Registration | Kilometers | Performance_HP |
|-----|---------------------------------------------------------------------------------------|-------------|--------------|------------|----------------|
| 350 | FORD FOCUS 2.3 EcoBoost RS AWD S S VEZETETT SZERVÍZKÖNYVES!!!! 13736 KM!!!!!!!!!!!!!! | 10.59 | 2017 | 13736 | 349 |
| 351 | FORD FOCUS 2.3 EcoBoost RS AWD S S BLACK EDITION. TULAJDONOSTÓL | 10.45 | 2016 | 18900 | 349 |
| 354 | FORD FOCUS 2.3 EcoBoost RS+ AWD S S | 7.90 | 2016 | 145000 | 349 |

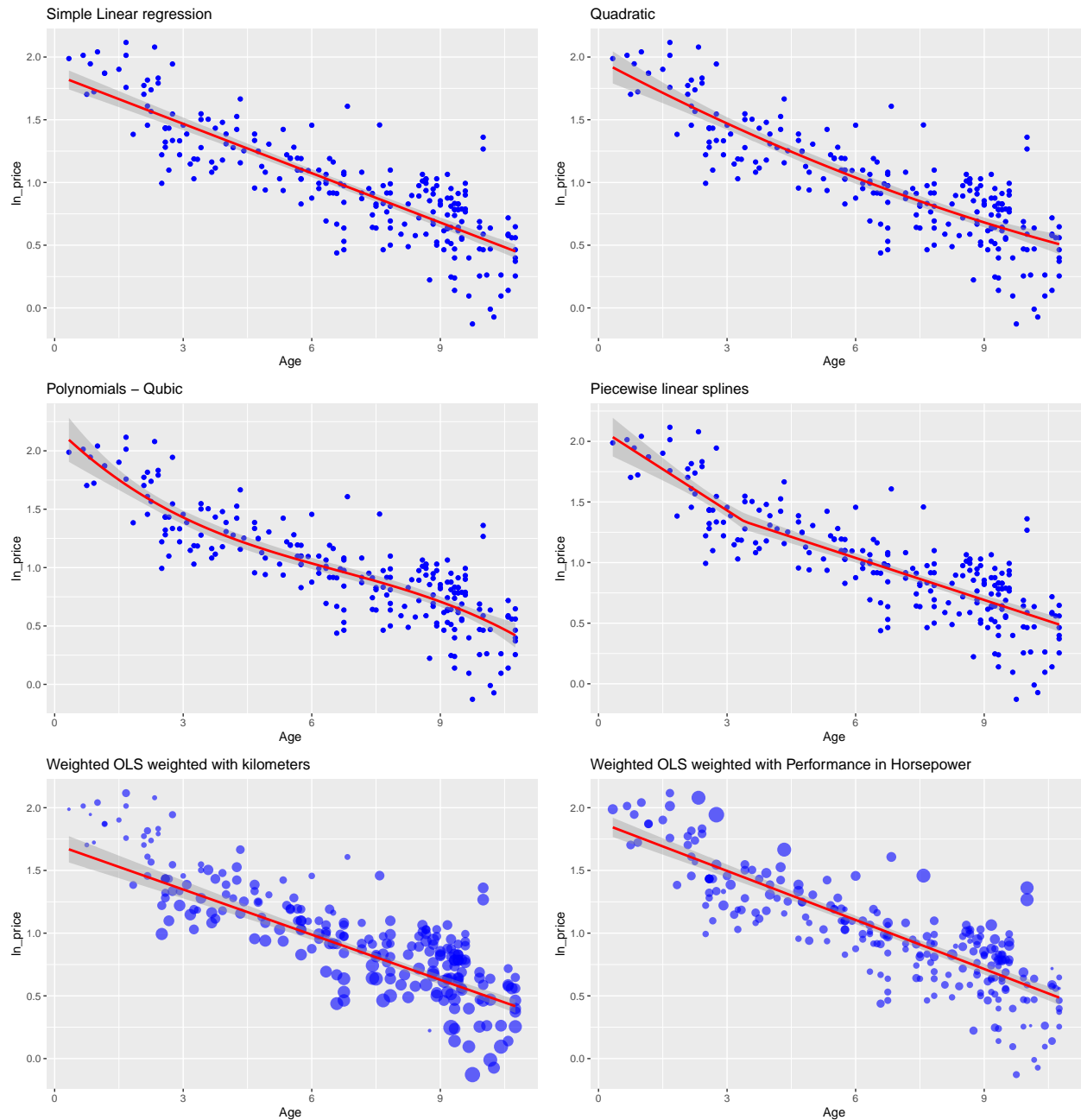
Transformations

After checking the transformations I decided to go with log Prices as using log of Price is usually a good method. Changes in percentage is often easier to interpret as well. Also taking log of Price is making the association closer to linear. Keep Age on level provides better interpretation as it is not very practical in percentage differences.



Regression estimation

Looking at the transformations, the best is the simple linear regression with an R-squared of 0.7504. It was very surprising in the analysis that the Weighted OLS regression with Kilometers in weight had pretty bad results with an R-squared of 0.56. According to the analysis the Weighted OLS with performance in horsepower weights was the second best regression with 0.69 R-squared, so power is more important than kilometers.



Residuals

Checking the best deals based on the residuals.

Table 2: Best Ford Focus deals according to the residuals

| ID | Name | Age | Price_mhuf | log1_y_pred | log1_res |
|-----|-----------------------------------------------------------------------------|-------|------------|-------------|-----------|
| 450 | FORD FOCUS 1.5 TDCI Trend Áfás! | 2.500 | 2.70 | 4.669756 | -1.969756 |
| 325 | FORD FOCUS 1.0 EcoBoost Titanium GARANCIÁLIS MAGASAN FELSZERELT ÚJSZERŰ! | 0.750 | 5.49 | 7.113740 | -1.623740 |

| ID | Name | Age | Price_mh | regl_y_pred | regl_res |
|-----|--------------------------------------------------------------------------------------------|-------|----------|-------------|---------------|
| 431 | FORD FOCUS 1.5 TDCI '88g' Titanium Econetic VEZETETT SZERVIZKÖNYV SÉRÜLÉSMENTES | 2.666 | 3.00 | 4.539255 | - 1.539255 |
| 358 | FORD FOCUS 1.5 EcoBoost ST-Line Tesztautó! | 0.333 | 7.30 | 8.761905 | - 1.461905 |
| 330 | FORD FOCUS 1.5 TDCI Titanium 1 ÉV GARANCIA-KÖNYV-CARPLAY | 3.250 | 2.80 | 4.137174 | - 1.337174 |
| 327 | FORD FOCUS 1.5 TDCI Trend MO-i.Egy tulajdonos.Ford-nál szervizelt.Áfá-s ár.Garanciális! | 1.833 | 3.99 | 5.299719 | - 1.309719 |
| 414 | FORD FOCUS 1.0 EcoBoost Trend | 2.500 | 3.39 | 4.669756 | - 1.279756 |
| 306 | FORD FOCUS 1.6 TDCi Trend Magyar | 6.583 | 1.55 | 2.704375 | - 1.154375 |
| 370 | FORD FOCUS 1.5 PFi Business 1500KM-es ÚJ AUTÓ | 0.916 | 5.60 | 6.707869 | - 1.107869 |
| 301 | FORD FOCUS 1.0 EcoBoost '99g' Trend | 6.750 | 1.59 | 2.653521 | - 1.063521 |