WHAT DRIVES USED AUDI CAR PRICES?

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INTRODUCTION

Even within the same brand and model, used car markets have significant price variation. Buyers, sellers, and regulators need to comprehend the causes of these price disparities.

RESEARCH QUESTION

Which observable characteristics help explain Audi used-car prices?

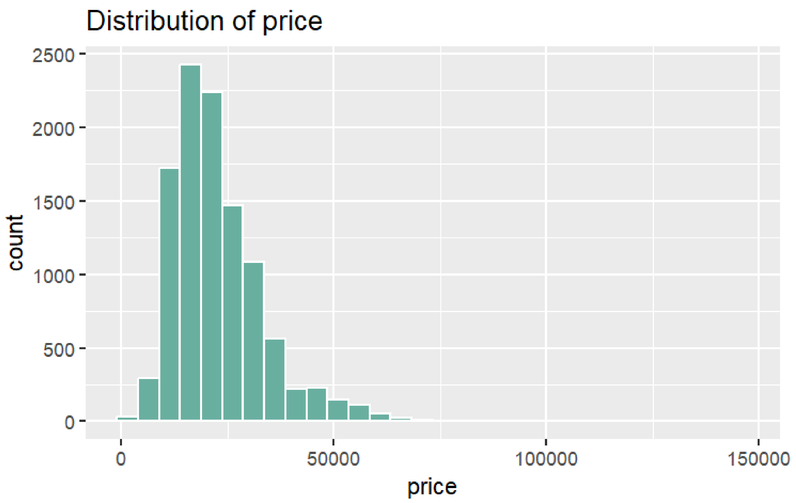

Figure 1. Distribution of used Audi prices

METHODOLOGY

Using listing data and an Ordinary Least Squares (OLS) regression framework, this study explores the factors that influence used Audi prices, determining which vehicle characteristics, such as mileage, fuel efficiency, taxation, transmission type, and engine size, have the strongest influence on price formation by modeling the logarithm of price.

We address potential violations of classical OLS assumptions by performing standard diagnostic tests and reporting robust standard errors to ensure reliable inference.

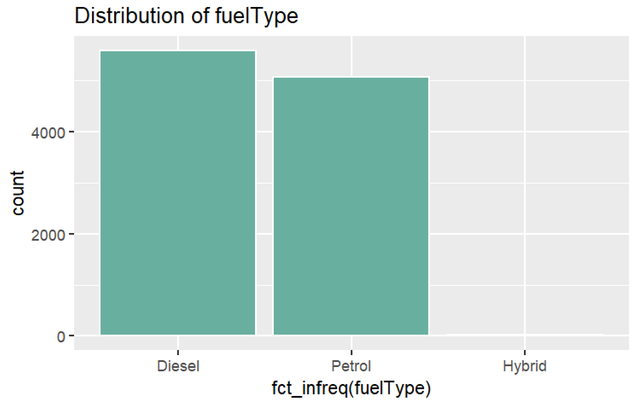

Figure 2. Distribution of fuel types in the sample

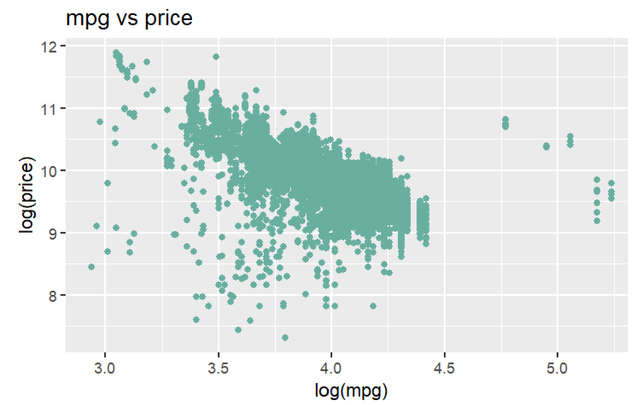

Figure 3. Relationship between fuel efficiency and used Audi prices

RESULTS

All the primary vehicle attributes are statistically significant predictors of used Audi prices, according to the OLS regression with robust standard errors.

Fuel efficiency (log(mpg)) and mileage show negative coefficients, suggesting that lower prices are related to higher fuel efficiency and usage.

Cars with manual transmissions show a significant negative price effect in comparison to the baseline category, whereas engine size has a positive coefficient.

A positive price premium is linked to the diesel fuel type.

The use of robust inference and non-linear terms is justified by diagnostic tests that reveal heteroskedasticity and point to possible functional form misspecification.

Variable	Estimate	Std. Error	t value	p-value
(Intercept)	1.2019e+01	1.4122e-01	85.1080	< 2.2e-16
mileage	-1.1598e-05	2.1503e-07	-53.9344	< 2.2e-16
tax	-3.7986e-04	6.4147e-05	-5.9217	3.285e-09
log(mpg)	-5.6708e-01	3.3962e-02	-16.6976	< 2.2e-16
engineSize	2.4941e-01	8.8194e-03	28.2795	< 2.2e-16
manual	-1.6930e-01	5.5485e-03	-30.5138	< 2.2e-16
automatic	-1.1418e-02	5.3800e-03	-2.1223	0.03384
diesel	8.7446e-02	8.4971e-03	10.2913	< 2.2e-16

Table 1. Robust OLS regression results (dependent variable: log(price))

FUTURE WORK

After performing a RESET test, we rejected H_0. This suggests that our model is misspecified, that is, it is missing nonlinear terms or interactions between the existing variables.

Unfortunately, we were unable to find a model for which H_0 was not rejected. Therefore, the conclusion that follows is based on the model shown above, which, due to its misspecification, might give biased estimates.

CONCLUSION

From a market perspective, it shows that buyers place greater value on performance-related attributes than on fuel efficiency when purchasing used Audi vehicles. Sellers can expect higher prices for cars with larger engines and diesel fuel types, while high mileage significantly reduces resale value.

Overall, the analysis provides practical insights into how specific vehicle characteristics influence price formation in the used Audi market, supporting more informed pricing and purchasing decisions.