HETEROSCEDASTICITY

Below we have the dataset of different models of car and the values of its attributes such as miles per gallon, gross horsepower and the weight (in lb/1000) of the car are given. Here we will try to check if there is any heteroscedasticity problem since this is a cross sectional dataset and has multiple variables (i.e., Multiple Regression).

|  |  |  |  |
| --- | --- | --- | --- |
| Model Name | Miles per gallon | Horse power | weight |
| Mazda RX4 | 21 | 110 | 2.62 |
| Mazda RX4 Wag | 21 | 110 | 2.875 |
| Datsun 710 | 22.8 | 93 | 2.32 |
| Hornet 4 Drive | 21.4 | 110 | 3.215 |
| Hornet Sportabout | 18.7 | 175 | 3.44 |
| Valiant | 18.1 | 105 | 3.46 |
| Duster 360 | 14.3 | 245 | 3.57 |
| Merc 240D | 24.4 | 62 | 3.19 |
| Merc 230 | 22.8 | 95 | 3.15 |
| Merc 280 | 19.2 | 123 | 3.44 |
| Merc 280C | 17.8 | 123 | 3.44 |
| Merc 450SE | 16.4 | 180 | 4.07 |
| Merc 450SL | 17.3 | 180 | 3.73 |
| Merc 450SLC | 15.2 | 180 | 3.78 |
| Cadillac Fleetwood | 10.4 | 205 | 5.25 |
| Lincoln Continental | 10.4 | 215 | 5.424 |
| Chrysler Imperial | 14.7 | 230 | 5.345 |
| Fiat 128 | 32.4 | 66 | 2.2 |
| Honda Civic | 30.4 | 52 | 1.615 |
| Toyota Corolla | 33.9 | 65 | 1.835 |
| Toyota Corona | 21.5 | 97 | 2.465 |
| Dodge Challenger | 15.5 | 150 | 3.52 |
| AMC Javelin | 15.2 | 150 | 3.435 |
| Camaro Z28 | 13.3 | 245 | 3.84 |
| Pontiac Firebird | 19.2 | 175 | 3.845 |
| Fiat X1-9 | 27.3 | 66 | 1.935 |
| Porsche 914-2 | 26 | 91 | 2.14 |
| Lotus Europa | 30.4 | 113 | 1.513 |
| Ford Pantera L | 15.8 | 264 | 3.17 |
| Ferrari Dino | 19.7 | 175 | 2.77 |
| Maserati Bora | 15 | 335 | 3.57 |
| Volvo 142E | 21.4 | 109 | 2.78 |

**MODEL BUILDING: -**

Here we take miles per gallon(mpg) as a dependent variable, horsepower and weight of the car as independent variables since the milage of the car depends on the power of the engine and the moment variable (weight).

**DESCRIPTIVE STATISTICS: -**



**CORRELATION: -**



As it is evident from the above table that the attributes mpg and weight are having a high degree correlation(negative) and there is a moderate degree of correlation between the attribute’s mpg and horsepower of the car, which can be justified since if a car has less weight and more horsepower it can travel more distance with less fuel intake producing more efficiency.

**SCATTER PLOT: -**



**LINE & SYMBOL PLOT: -**



**REGRESSION OUTPUT: -**



Estimated model: Mpg = 37.22727 + (-3.877831) \*(wt) + (-0.031773) \*(hp)

**WHITE TEST: -**



**CONCLUSION: -**

From the OLS method the values of R-squared and Adjusted R-squared are 0.826 and 0.814 which means that our proposed model has a good explanatory power. The probability values off the coefficient, variables and the F-statistic are also statistically significant. From the white test, the probability value of Chi-Square is 0.2569 which smaller than the F critical value which is 0.2802. Since this does not lie in the acceptance region, the null hypothesis stating that the data is homoscedastic is rejected and the alternative hypothesis which states that the data is heteroscedastic is accepted. Hence, the white test concludes that data is heteroscedastic, as a result the estimated coefficient in the equation does not possess the characteristics of BLUE.

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