In bivariate analysis, the terms *homoscedasticity* and *heteroscedasticity* describe the consistency of variance in the residuals across different values of an independent variable:

1. **Homoscedasticity**: This condition implies that the variance of residuals or errors is constant across all levels of the independent variable. In a scatter plot, the spread of points around the regression line remains roughly the same as you move along the x-axis. Homoscedasticity is a core assumption of linear regression and many statistical tests because it implies that the model's predictive accuracy is consistent across the data range.
   * **Rule of Thumb**: If the residuals display a random pattern without any clear fanning or funneling effect in a residuals vs. fitted values plot, then homoscedasticity can be assumed.
2. **Heteroscedasticity**: In this condition, the variance of residuals changes across levels of the independent variable. This means that the spread around the regression line increases or decreases as the value of the independent variable changes. In residuals plots, heteroscedasticity often shows as a "fan" or "funnel" shape, where the residuals either spread out or narrow down as you move along the x-axis. Heteroscedasticity can undermine the reliability of the regression coefficients and can lead to biased or inefficient estimations.
   * **Rule of Thumb**: If residuals show a clear pattern, such as a cone shape (fanning out or narrowing in), heteroscedasticity is likely present.

**Which is Better?**

In general, **homoscedasticity is preferable** when performing linear regression or related parametric tests. Homoscedasticity ensures that the model's error is uniformly distributed, which is an assumption for many standard statistical tests. Heteroscedasticity, on the other hand, can indicate problems with model fit or data structure, suggesting that a different modeling approach (e.g., weighted least squares, transformation of variables) might be needed to correct or account for the varying spread.Top of Form

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