Skewness.

"Skewness" measures the lack of symmetry. It is measured by $\gamma_1 = \frac{\sum(x_i - \mu)^3}{\{\sum(x_i - \mu^2)\}^{3/2}}$ and is denoted by γ_1.

The distribution is skewed if,

(i) Mean ≠ Median ≠ Mode

(ii) Quartiles are not equidistant from the median and

(iii) The frequency curve is stretched more to one side than to the other.

(1) **Distribution:** There are three types of distributions

(i) **Normal distribution:**When $\gamma_1 = 0$, the distribution is said to be normal. In this case

Mean = Median = Mode

(ii) **Positively skewed distribution:**When $\gamma_1 > 0$, the distribution is said to be positively skewed. In this case

Mean > Median > Mode

(iii) **Negative skewed distribution:**When $\gamma_1 < 0$, the distribution is said to be negatively skewed. In this case

Mean < Median < Mode

(2) **Measures of skewness**

(i) **Absolute measures of skewness:** Various measures of skewness are

(a) $S_K = M - M_d$ (b) $S_K = M - M_o$ (c) $S_k = Q_3 + Q_1 - 2M_d$

where, M_d = median, M_o = mode, M = mean

Absolute measures of skewness are not useful to compare two series, therefore relative measure of dispersion are used, as they are pure numbers.

(3) **Relative measures of skewness**

(i) **Karl Pearson's coefficient of skewness:** $S_k = \frac{M - M_o}{\sigma} = 3\frac{(M - M_d)}{\sigma}$, $-3 \le S_k \le 3$, where σ is standard deviation.

(ii) **Bowley's coefficient of skewness:** $S_k = \frac{Q_3 + Q_1 - 2M_d}{Q_3 - Q_1}$

Bowley's coefficient of skewness lies between –1 and 1.

(iii) **Kelly's coefficient of skewness:** $S_K = \frac{P_{10} + P_{90} - 2M_d}{P_{90} - P_{10}} = \frac{D_1 + D_9 - 2M_d}{D_9 - D_1}$