Economics 250
Coefficient of Variation

As background, remember that a variable x and its standard deviation s are measured in the same units. If we multiply every observation of x by 10 we'll also multiply s by 10. That means that we can easily find the effect on the standard deviation if we convert temperature data from celsius to fahrenheit or convert prices from dollars to euros.

Sometimes we want to express how dispersed something is without relying on specific units. The coefficient of variation does this, by reporting the ratio of the standard deviation to the mean. We usually then multiply by 100 so that the result is in percentage terms. Thus, the coefficient of variation for a sample is:

$$\frac{s}{\overline{x}} \times 100,$$

while for a population it is:

$$\frac{\sigma}{\mu} \times 100.$$

Notice that this statistic is units-free: switching temperature scales or currencies won't affect it.

Imagine you are studying two stock prices. One has a standard deviation of 10 and a mean of 100. The other has a standard deviation of 4 and a mean of 20. If you compare standard deviations, you might conclude that the first stock is riskier. But notice that the coefficient of variation is twice as high in the second case: relative to its average value, the fluctuations in the second stock price are greater.