

# What is Standard Deviation?

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## Standard Deviation Definition

Standard Deviation is a statistical term used to measure the amount of variability or dispersion around an average. Technically it is a measure of volatility. Dispersion is the difference between the actual and the average value. The larger this dispersion or variability is, the higher is the standard deviation.

## Case to Consider

If you invest in XYZ shares (assume that we are listed) you can generate an average year on year return of 25%. If I see any other stock, I would not be able to generate more than 20%. Would you invest in XYZ stocks?

If it had been the good old pre quantitative heavy investing days, I know you would have gladly invested in XYZ. But now the life is not that easy, Managers understand Risk. They dont like to invest in shares that go up and down everybody wants a stable life!

## Business Consideration

Average return (or for that matter any average), never tells you the full story. It gives you the central value of data, but does not tell you about the spread. It says that you can generate 25% return, but does not tell you that the return can be -10% to 60%, so that the average would be 25% (But you might have to exit at -10%).

So we need to measure spread (which is akin to risk!)

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# Measuring Spread (Risk) using Range



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I love asking this question in all the workshops that I take! If I were to ask you the simplest measure of spread, what would pop in your mind? Nay don't tell me that standard deviation or variance (95% of the times I get this as the answer)!

I would say that the simplest measure is Range [Min, Max]. It gives me a fair idea of spread.

But it again gives me only half of the story. The Minimum and Maximum might be skewed. It would be the same for data sets that are uniform, but have an extreme min and max and same for skewed data around min and max.

***Excel gives simple functions to calculate Range. Min and Max.***

## Measuring Spread Using Standard Deviation

Just like Range gave us the simple measure of spread by telling us the Min and Max values of data, we have another measure called standard deviation (or an equivalent measure called variance) to measure spread. Standard Deviation essentially

- Measures the spread (Differences of individual data points) from the mean
- Squares the differences (So that positives and negatives all become positive)
- Takes the average of these squared differences
- Excel makes your life easier. Just use the function, **StdevP** or **VarP** and show it the data. It does all the number crunching on its own!

***Use StdevP for Measuring Standard Deviation***

***Use VarP for Measuring Variance***

## Reasons why Standard Deviation is very Popular

Standard deviation has its **Free Downloads (Download)** other measure of spread.

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- It measures the deviation from the mean, which is a very important statistic (Shows the central tendency) **Know More (<https://api.whatsapp.com/send?phone=918828322444&text=Hi%20,I%20need%20some%20course%20assistance>)**
- It squares and makes the negative numbers Positive
- The square of small numbers is smaller (Contraction effect) and large numbers larger (Expanding effect). So it makes you ignore small deviations and see the larger one clearly!
- The square is a nice function!

## Standard Deviation and Finance

Perhaps standard deviation is the most important concepts as far as finance is concerned. Finance and banking is all about measuring and managing risk and standard deviation measures risk (Volatility). Standard deviation is used by all portfolio managers to measure and track risk. One of the most important ratios in portfolio management, Sharpe Ratio (for which William Sharpe got a Nobel Prize) uses Standard Deviation to measure risk adjusted return (and hence provides incentives to portfolio managers to generate return by taking minimum risk).

The most important certifications in finance CFA (<https://www.edupristine.com/courses/cfa/>) and FRM (<https://www.edupristine.com/courses/frm/>) also put a lot of stress on measuring and managing risk. There are scores of questions based on the concept of measuring standard deviation and related metrics.

Have you encountered any such problems? If yes, why don't you share it with us?

## Next Steps

If you use Excel to find standard deviation, it not only provides you with **StdevP()** function, but also with a plethora of other functions like: **Stdev()**, **StdevA()**, etc. You should try and understand these functions as well. In one of the next tutorials, we will delve deeper into these functions.

For any queries regarding the concepts or modeling in Excel, feel free to put your comments in the comments section below.

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