# Tutorial : Risk

This document is set as follows: a brief introduction to the notion of risk in Finance and how to calculate it. Finally, an exercise will help you to better understand how to compute the risk of a stock.

## The notion of risk in Finance

**The risk**

In finance, the risk is actually the chance that the actual return of an investment is different from the one expected. The risk is something an investor tends to avoid as it includes the possibility of losing some a part or the totality of his initial investments.

The risk of a specific investment is measured by the standard deviation of its historical returns.

**Risk and Reward**

All investments involve a degree of risk, in exchange for which the investor will expect a return that compensates the risk taken. In general the higher the risk is, the more an investor can expect receiving from holding an investment and the lower the risk is, the less he should expect.

Among the 3 main asset categories, stocks are the riskiest but also have the highest returns. Regarding the bonds, they are less risky than stock and so offer lower returns. Finally cash is considered as the safest investment but also the less profitable.

## Calculating the risk

**Standard Deviation**

To calculate the standard deviation/risk of an investment we use the following formula:

Where :

is the return of the investment for a given period (day, month, year, …),

is the average return of the investment,

n is the number of periods considered.

Example:

Let’s calculate the risk of the Stock A

|  |  |
| --- | --- |
| Year | Return of the stock A |
| 1 | 6% |
| 2 | -3% |
| 3 | 8% |
| 4 | 3% |
| 5 | -5% |
| Return Average of Stock A : | **1.8%** |

**Risk/Reward Ratio**

This ratio is used by the investors to compare the expected return of an investor with the risk undertaken to reach that return.

This ratio can be calculated by dividing the amount of money an investor can lose with this investment (risk) by return he could expect in the best case scenario (reward).

Example:

Let’s assume that a stock is currently worth 50$ and we expect it to reach 60$ in the next months. We have 500$ to invest so we can buy 10 shares. Our Risk/Reward can be calculated as follows: the money we except to earn with that investment (10\*10=100$) divided by the money we risk to lose with such an investment (500$).

The risk/reward ratio is then 0.2:1 (0.2 “unit” of reward per “unit” of risk). Most investors wouldn’t consider this investment because the reward is too low compared to the risk taken.

Now let’s suppose that we place a loss-stop order at 45$, the money we risk to lose with that investment is now: (50-45)\*10=50$.

The new risk/reward ratio is then: 2:1 which starts to become interesting for an investor.

## Exercise

Now let’s work with some real market data, you will find below a spreadsheet with all the daily prices of [Qantas Airways Limited](GOOG-ASX_QAN.xlsx) since (11-27-2012).

The objective will be to calculate the risk of that stock.

* To do so, add a new column “return” and calculate for each day the arithmetic return of the stock using the close prices (cf tutorial : Returns).
* Calculate the stock’s average return
* Add a column : “(return-average)²” and calculate
* Calculate the stock’s risk (standard deviation)

[solution](GOOG-ASX_QAN%20-%20Solution.xlsx)