***Calculation Example: Mean and Median Prices***

**Question 1:** A stock has an arithmetic average continuously compounded return (AALGDR) of **10**% pa, a standard deviation of continuously compounded returns (SDLGDR) of **16.45**% pa and current stock price of $**1**.

In **20** years, what do you expect its **mean** and **median** prices to be?

Assume that stock prices are log-normally distributed.

**Answer:** The median price can be found with the formula.

The mean price is a little harder.

***Calculation Example: Probabilities***

**Question 2:** A stock has an arithmetic average continuously compounded return (AALGDR) of **10**% pa, a standard deviation of continuously compounded returns (SDLGDR) of **46.52**% pa and current stock price of $**1**.

In **50** years, what do you expect its **mean** and **median** prices to be?

Assume that stock prices are log-normally distributed.

**Answer:** The median price can be found with the formula.

The mean price is a little harder.

The mean is a lot bigger than the median.

**Question 2:** What is the probability of the share price exceeding the **median** price of $148.41 in 50 years?

**Answer:** The median price is the ‘middle price’ when all possible prices are arranged from smallest to biggest. So the chance of achieving a price higher than the median is always 50%.

**Question 3:** What is the probability of the share price exceeding the **mean** price of $33,199.03 in 50 years? Note that the mean is the arithmetic mean.

**Answer:** The chance of achieving a price more than the mean will be less than 50%.

To find the exact probability, convert the **log-normally** distributed prices into **normally** distributed continuously compounded returns (LGDR’s).

Note that these returns and the standard deviation are all measured over the 50 year period, they’re not per annum.

By standardising these continuously compounded returns into Z scores we can then find the probability of exceeding the mean price.

Therefore there’s only a 5% chance of the stock price exceeding the mean expected future price of $33,199.03 in 50 years!

However, there’s a 50% chance of the stock price exceeding the median expected future price of $148.41 in 50 years.

As you can see, the longer the time, the larger the difference between the mean and median, and the smaller the probability of exceeding the mean return.