## 5-year Time Horizon Future Projections

For the following simulations we have used a Geometric Brownian Motion model to simulate industry returns. This is a Markov process means that the model prediction for “tomorrows” industry return is only dependant on “today’s” industry value and no other time point in the past. The simulated value is consistent with the weak form of the efficient market hypothesis, which assumes past price information has already been incorporated. Specifically, it assumes that price momentum does not exist. The industry returns at time [t] are generated from our GBM model. The price at [t+1] is then calculated by multiplying the return at [t] by the price at [t].

## Key Advantages of Geometric Brownian Motion (GBM)

* The expected returns of GBM model are independent of the actual value of the industry which agrees with what we would expect in reality.
* A GBM process only assumes positive values which fits as industry values can’t be negative.
* A GBM process shows the same kind of random effects in its paths that we see in real returns.

Our specific GBM model incorporates two terms which are linked to the expected return and standard deviation of the relevant industry. The simulated returns also feature a random component which simulates random shocks experienced by each industry. This allows the model to accurately capture the trend of the industry while also considering unpredictable risks.

## Visualising the Projected Returns over 5-year Time Horizon

To display these simulated returns in a more direct manner we assumed a €100 investment in each industry on the 30th September 2019. The valuations are calculated using our simulated returns.

## Summary Statistics for 5-year Simulations

Each industry was simulated 1825 days (5 x 365). Below is a performance summary for each, the numerical statistics are related to the projected final return at end of 5 years.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Industry** | **Agric** | **Food** | **FabPr** | **Mach** | **ElcEq** | **Autos** | **Guns** | **Gold** | **Mines** | **Coal** |
| **Mean** | 0.69 | 1.20 | 0.37 | 1.21 | 0.93 | 0.58 | 1.49 | 0.42 | 0.50 | 0.46 |
| **Median** | 0.57 | 1.14 | 0.12 | 0.57 | 0.91 | 0.45 | 1.32 | 0.14 | 0.37 | -0.11 |
| **Std.Dev** | 1.16 | 0.71 | 0.96 | 1.74 | 0.77 | 0.81 | 1.65 | 1.24 | 0.83 | 1.12 |
| **High** | 3.74 | 2.39 | 3.43 | 6.37 | 2.71 | 3.11 | 6.19 | 4.09 | 2.50 | 2.67 |
| **Low** | -0.59 | 0.12 | -0.52 | -0.21 | -0.20 | -0.30 | -0.23 | -0.75 | -0.61 | -0.70 |

* The Food and Guns industries provide the highest average returns over the 5 year time horizon.
* Food is the only industry within our simulations that provided a minimum return larger than zero.
* The Food and Electrical Equipment industry provides the least risky investment according to our simulations.