UNIVERSIDAD
POLITÉCNICA
DE MADRID

Data-driven portfolio management

Programming For Data Science - Group 5

Authors:
Enrile Lacalle, Hugo
Goloumis Contreras, Alejandro
Ramírez Moreno, Joel

For the first two plots, 100 random portfolio allocations were chosen.

1. **Return.**
   As it can be seen in the plot, the probability of obtaining a positive return is highly correlated with longer periods. However, we have to take into account that in March 2020 the covid-19 crisis broke out, which is clearly reflected in the 3-month period, where in the vast majority of portfolio allocations the return is negative. From the peak of the SP500 on 14 February 2020 to 21 August 2020, where pre-pandemic values were recovered, 5 months elapsed. From the sixth month of investment onwards, much higher returns start to occur due to the beginning of the economic recovery. This is further accentuated in the last two periods of 9 and 12 months.

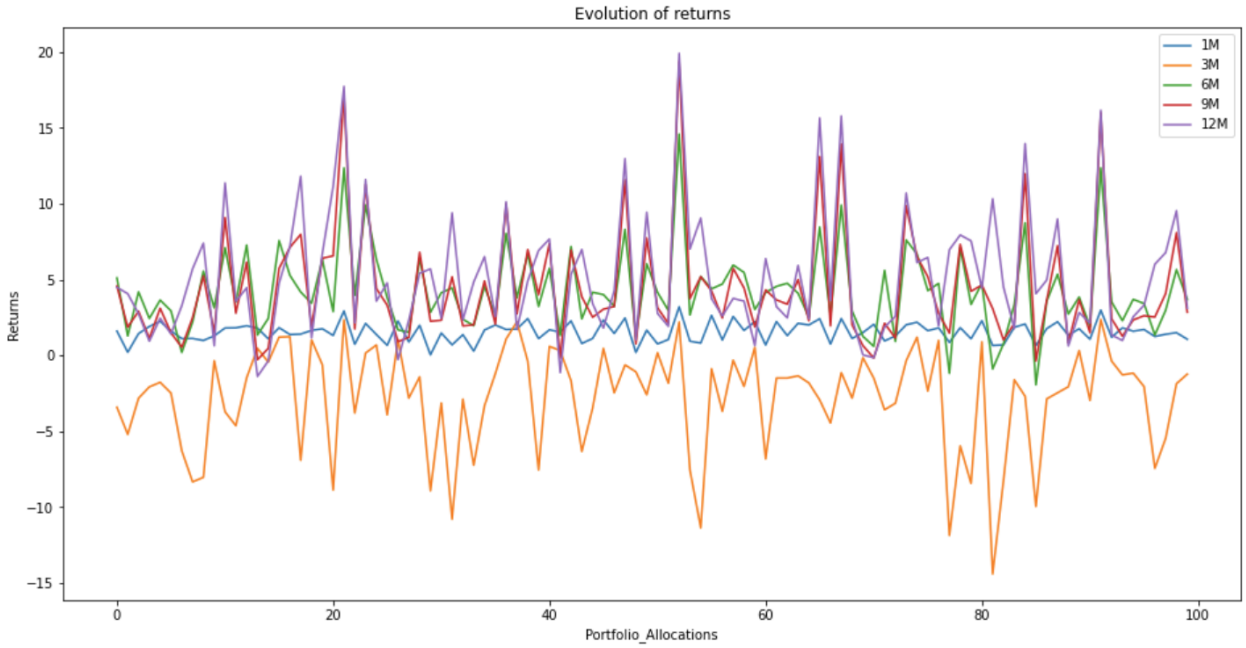

Figure 1: Evolution of returns

2. **Return vs. risk.**
   The conclusion that can be extracted is that profit and risk are correlated, but this is not always the case. As it can be seen, the higher the risk, the greater the benefit, but there are quite frequent cases where the higher the risk, the lower the benefits, even negative ones. The assertion that whenever greater risk is assumed, the benefit is greater is false.

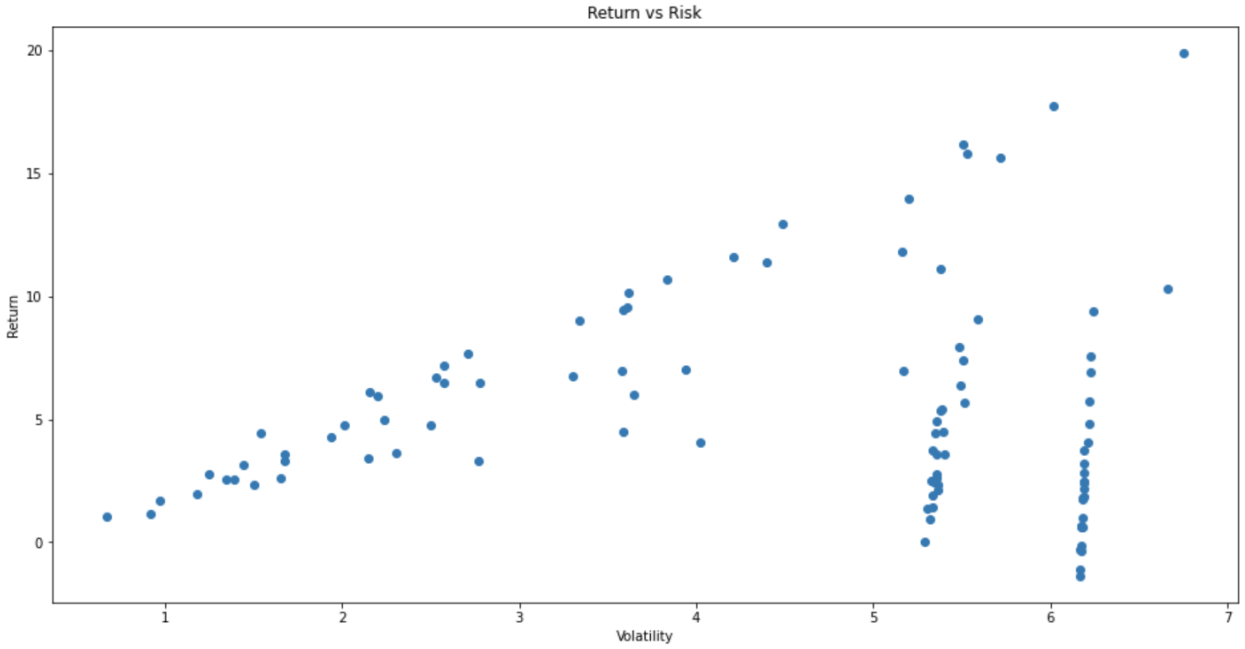

Figure 2: Return vs Risk

3. **Financial advisoring.**

Following the client's instructions, the various possible combinations have been sought that allow 90% of the client's money to be invested heterogeneously distributed between only two types of assets: CB and PB. We have assumed that the reservation of 10% of his money means that he does not invest it, not that he buys Cash type assets (CA). These combinations have been used to calculate 12-month return metrics (January 1 to December 31, 2020).

After analyzing the return results obtained in all the possible combinations specified, it can be seen that the suggested practice is not a good idea. In Figure 2 it is possible to see how the returns obtained for each portfolio allocation show negative values (or, in other words, losses), or low profits in the best case. For this reason, the client is not recommended to opt for this investment strategy.

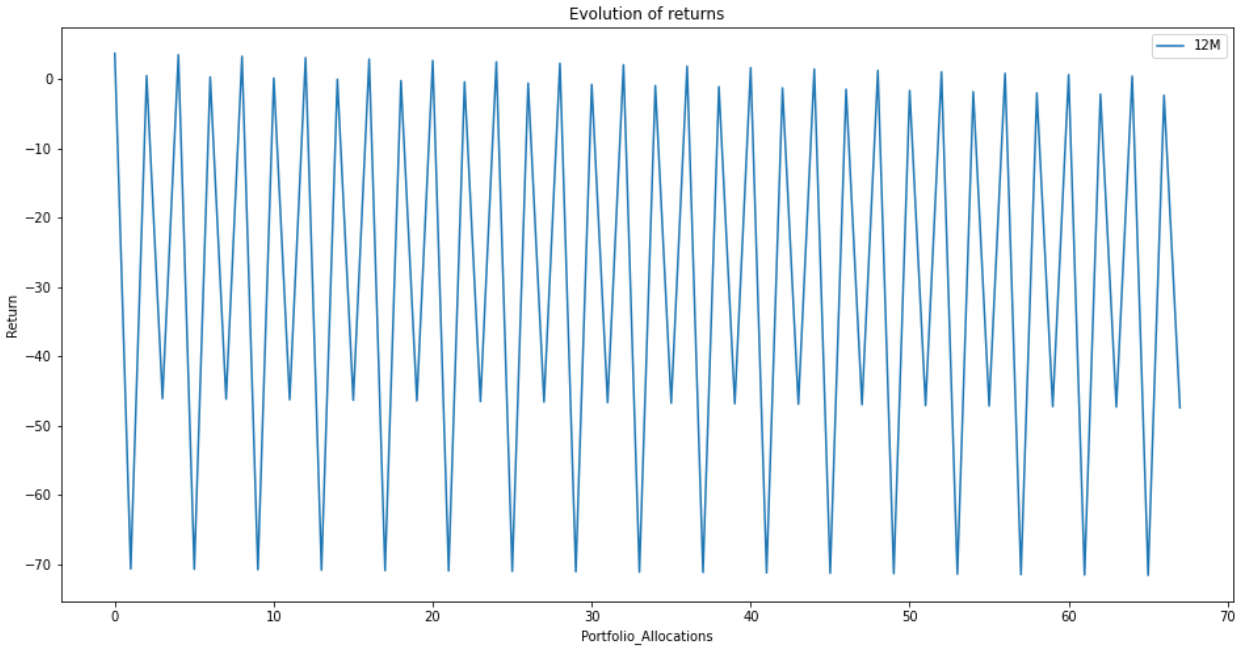

Figure 3: Evolution of the returns for CB & PB

The company would recommend that the investment to be made should be for the long term, since, as demonstrated in the previous sections, the highest profits are obtained after the sixth month.
Historically, to maximize profits the best way to achieve this is through an overexposure to stocks of around 80% of the capital available for investment, as on average, you get about 8% annual accumulated (taking into account average inflation), if you want to have a more conservative portfolio you could allocate a portion to bonds and gold. The only investment method that is never advisable is to keep the investment in cash, because due to inflation this loses purchasing power year after year, on average between 2-4% historically.

As can be seen in the graphs above, the best option would be to opt for the 1-OFF methodology/strategy instead of DCA, as the highest returns are consistently achieved. Regarding rebalancing, on average both methodologies obtain the same approximate results, however, they differ in the disparity of results. When rebalancing is applied, a greater number of peaks and valleys are obtained, so a greater profit could be obtained, but also a greater loss, while if rebalancing is not applied, the results are more consistent.

The recommendation from the company would be, if you want to have a higher risk exposure, you could achieve a higher profit by applying 1-OFF with rebalancing, while if you want more consistent results (this is the most advisable in most cases) you should apply a 1-OFF strategy without rebalancing.