

\$ as humanly possible without it being (bi)polar)

2. Constraints:

- The portfolio's beta (a measure of its *volatility* relative to the market; i.e., how *silly* and *spread out* it is relative to the 'market') must be between -0.5 and 0.5 .
- The sum of the weights assigned to each asset in the portfolio must equal 1 (i.e., ***we gotta put our money to work!*** As such, let's buy a bunch of stuff that can make us money but, also, let's (try) not to violate the [Laws of Probability Theory](#)).
- Each individual weight can range from -2 to 2 (i.e., we can be like *certain individuals* from [WallStreetBets](#) and put all our eggs in one basket or, like a more prudent investor, do anything *but that*).

2.3.2 Strategy II Breakdown

1. **Objective:** Maximize returns relative to the portfolio's **tracking error volatility (TEV)**, which measures how much the portfolio's returns deviate from a benchmark (e.g., the S&P 500 or 'big boy stock market').
2. **Constraints:**
 - The portfolio's beta (a measure of its *volatility* relative to the market; i.e., how *wild* and *crazy* it gets compared to the 'market') must be between -2 and 2 .
 - The sum of the weights assigned to each asset in the portfolio must equal 1 (i.e., ***we need to make sure all our money is actively working!*** So, let's diversify our investments while still following the [Laws of Probability Theory](#)).
 - Each individual weight can range from -2 to 2 (i.e., we can either go *all in* on one asset like *those wild investors* on [WallStreetBets](#), or spread our investments more wisely).

Don't worry about all the fancy schmancy 'math'(matics); math is for nerds (yours truly, included). All math is, is it's another language. The more you practice it, the better you get.

Anyways, that's enough of my rambling and yapping. Let's explore the setup (in da next section *insert cool kid emoji*)!

3 Assumptions and (Analysis) Setup

So, if you made it this far, you deserve a cookie! 🍪

Nice job. 😎

Alrighty, enough [shenanigans](#). Let's get (back) to work:

3.1 Setup

To make it easier, we will make the following assumptions for this ([swag\(gy\)](#)) project:

1. The portfolios will be *reallocated* (reoptimized) weekly from the beginning of **March 2007** to the end of **March 2024**.
2. Once the (fancy, math-y) models are made, let's think about three cases or situations for the input construction:
 - Long-Term Look-Back Period : 120 Data Points for estimation of a Sample Covariance & Sample Mean; i.e., Scenario LT $\equiv S_{120}$.
 - Medium-Term Look-Back Period : 90 Data Points for estimation of a Sample Covariance & Sample Mean; i.e., Scenario MT $\equiv S_{90}$.
 - Short-Term Look-Back Period : 40 Data Points for estimation of a Sample Covariance & Sample Mean; i.e., Scenario ST $\equiv S_{40}$.
3. Consider two possible values for the **Target Beta** (again, *not* the colloquial slang term) : 0 & 1.
4. Consider two possible values for the λ (the *risk aversion parameter*; i.e., how much are you putting on black?) : 0.10 & 0.50.