Projet d'Approfondissement en Finance: Net Zero Investing With Impact

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Abstract

1 Introduction

The financial sector plays a crucial role in achieving the temperature goals outlined in the Paris Agreement by reallocating financial resources from polluting industries to more sustainable ones. This process is embodied in the concept of portfolio alignment, which involves building investment portfolios whose emission profiles align with global emissions scenarios consistent with the temperature targets. Portfolio decarbonization can be approached in three main ways:

- **Divestment and reinvestment:** Redirect investments from industries with high greenhouse gas emissions to those with lower emissions. However, this approach faces challenges since certain polluting industries, like steel production, are essential for the transition, and there are currently not enough green industries to absorb these redirected investments.

- **Supporting transitional companies:** Invest in companies that are currently high emitters but are on track to significantly reduce their emissions over the medium to long term. This method is more complex as it requires estimating companies' future emission trajectories. Nevertheless, it is more effective, as it ensures funding for essential industries while avoiding a significant reduction in the pool of investable companies.

- **Impact investing:** Focus on companies likely to use additional funding to implement projects aimed at reducing emissions, which they might not pursue without external financial support.

Early methodologies for portfolio decarbonization primarily relied on the first strategy. Recent approaches have incorporated both the first and second strategies. This project, conducted in partnership with Kepler Cheuvreux, an independant European financial services company, aims to explore how elements of impact investing can be integrated into portfolio decarbonization strategies.

Our approach throughout this first part of the year is based on the article (**?**). The objective of this article is to construct a portfolio which satisfies certain conditions both on the decarbonization and the net zero investing of its assets.

2 Definitions and metrics

We describe here some of the metrics used to assess the net zero investment policy. We must consider two dimensions: the decarbonization dimension, and the transition dimension. Indeed, building a net zero investment portfolio has to satisfy two goals: decarbonizing the portfolio, and financing the transition. We thus consider two types of metrics. Net zero carbon metrics are used to assess the decarbonization dimension, and net zero transition metrics for the transition dimension. Moreover, we have to take into account the dynamic properties of net zero investing. Indeed, a net zero emissions scenario is described by a trajectory.

Définition 2.1 (Carbon emission)**.**

$$\mathcal{CE}(t) = (1 - \mathcal{R}(t_0, t))\mathcal{CE}(t_0) \tag{1}$$

Where $\mathcal{R}(t_0, t)$ is the reduction rate of the carbon footprint between the years t_0 and t. We also assume $\mathcal{CE}(2020) = 36GtCO_2e$.

Définition 2.2 (Carbon intensity)**.** The carbon intensity is a normalization of the carbon emissions.

$$\mathcal{CI} = \frac{\mathcal{CE}}{Y} \tag{2}$$

Where Y is a normalization constant.

3 Description of the method

We describe here the method used in (**?**) to define and construct a net zero portfolio. We have a dynamic approach, where we want to find the optimal portfolio $x^*(t)$ at each date t. To construct our portfolio, we want to solve the following optimization problem.

Optimization problem Let x be a portfolio and Σ the covariance matrix of stock returns. We want to minimize the tracking error variance of the portfolio x with respect to a benchmarck b, subject to a carbon reduction constraint:

$$x^*(t) = \text{argmin}\frac{1}{2}(x - b(t))^T\Sigma(t)(x - b(t)), \quad \text{s.t.} \begin{cases} \mathcal{CI}(t, x) \leq \big(1 - \mathcal{R}(t_0, t) \cdot \mathcal{CI}(t_0, b(t_0))\big) \\ x \in \Omega_1 \cap \Omega_2(t) \end{cases} \tag{3}$$

Where $\mathcal{CI}(t, x)$ the carbon intensity at time t of the portfolio x, and $\mathcal{CI}(t, b(t))$ is the carbon intensity at time t of the benchmark. Ω_1 and $\Omega_2(t)$ are sets of additional constraints.

4 Conclusion

References

Ines Barahhou, Mohamed Ben Slimane, Thierry Roncalli, and Noureddine Oulid Azouz. Net zero investment portfolios - part 1. the comprehensive integrated approach. October 13 2022. Available at SSRN: https://ssrn.com/abstract=4283998 or http://dx.doi.org/10.2139/ssrn.4283998.