1 Results

For the following results we consider 3 types of parameterizations for the portfolio problem. The first is a simple case where the assets are identically distributed as seen in (Cai, Judd and Xu 2013), the second is a case where the parameters are chosen to match the parameters in (Schober, Valentin and Pflüger 2022) also seen in (Gaegauf, Scheidegger and Trojani 2023), and the last is a modification of the first case where the correlation between the assets is larger (correlation coefficient of 0.75).

Table 1: Parameters for Examples of Portfolio Problems

	i.i.d Assets	**Schober Parameters**	**High Correlation**
T	6	6	6
k	3	5	3
γ	3.0	3.5	3.0
τ	0.5%	0.5%	0.5%
β	0.97	0.97	0.97
r	3%	4%	3%
$\mu^\top$	(0.07, 0.07)	μ_{Shober}	(0.07, 0.07)
Σ	$\begin{bmatrix} 0.04 & 0.00 \\ 0.00 & 0.04 \end{bmatrix}$	Σ_{Schober}	$\begin{bmatrix} 0.04 & 0.03 \\ 0.03 & 0.04 \end{bmatrix}$

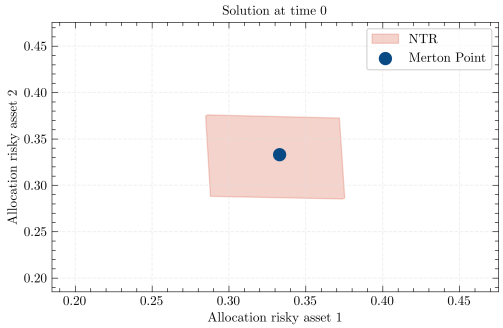
$$\mu_{\text{Schober}}^\top = \begin{bmatrix} 0.0572 & 0.0638 & 0.07 & 0.0764 & 0.0828 \end{bmatrix}$$

$$\Sigma_{\text{Schober}} = \begin{bmatrix} 0.0256 & 0.00576 & 0.00288 & 0.00176 & 0.00096 \\ 0.00576 & 0.0324 & 0.0090432 & 0.010692 & 0.01296 \\ 0.00288 & 0.0090432 & 0.04 & 0.0132 & 0.0168 \\ 0.00176 & 0.010692 & 0.0132 & 0.0484 & 0.02112 \\ 0.00096 & 0.01296 & 0.0168 & 0.02112 & 0.0576 \end{bmatrix}$$

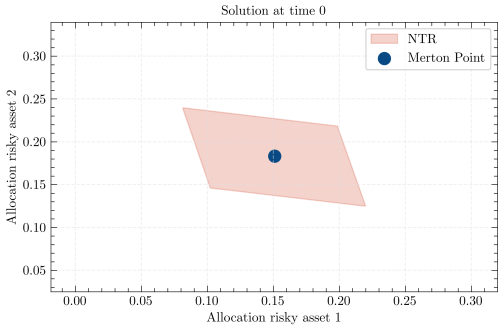
1.1 Dynamic Portfolio Choice without consumption

I first consider the base model with proportional transaction costs and no consumption. In the absence of consumption, the optimal portfolio is the merton points, which we plot in every figure. I plot the No-trade region at time point 0 (initial time point) for each of the parameterizations in Figure 1.1. When using the Schober parameters we select the d first elements of the mean vector, and truncate the covariance matrix to a $d \times d$ matrix, depending on the number of assets d in the model.

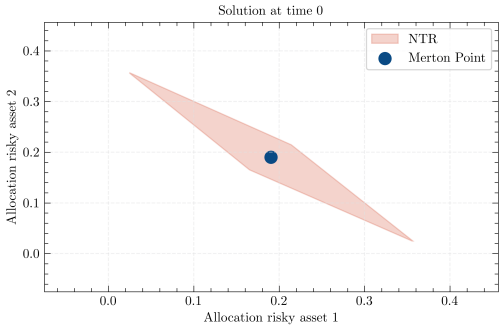
Figure 1.1: Comparison of No Trade Regions.



(a) No Trade Region for Independent Identically Distributed Assets.



(b) No Trade Region for Schober Parameters.



(c) No Trade Region for High Correlation.

1.1.1 Investigating the No-Trade Region

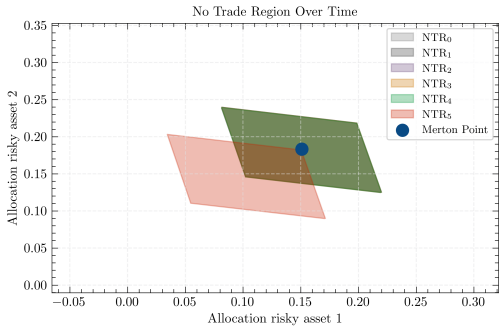
We now look at the No-Trade region for the base model with proportional transaction costs and no consumption in more detail. Specifically we look at how the region behaves over the entire investment horizon $[0, T]$, and how the region changes with different transaction cost levels. We choose to look at the model with the Schober parameters, as this is a mixture of the other two parameterizations.

Note that for larger values of τ the NTR is larger, which is to be expected...

1.1.2 Increasing the dimensionality of the model

We now increase the dimensionality of the model to $d = 3$ and look at the No-Trade region for the Schober parameters.

Figure 1.2: No Trade Region for Schober Parameters over Time.



The No-Trade region is plotted for the Schober parameters over the entire investment horizon $[0, T]$ For time points $t \in [0, T-1]$ the no-trade-region (NTR)s overlap.

Figure 1.3: No Trade Region for the iid Parameters with different values of τ.

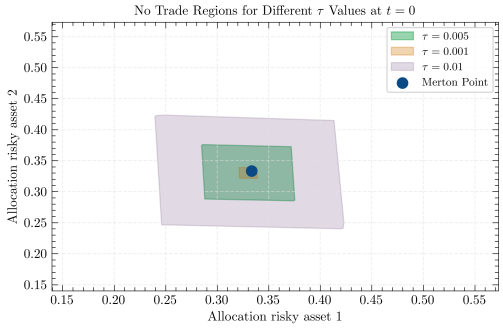


Figure 1.4: No Trade Region for the Schober Parameters with $d = 3$.