(widening) of the bond-CDS basis, see [Mai (2019)] for background.

- **Other:** Positions that cannot be attributed to some other bucket. Usually, these arise as left-overs of some closed positions, for instance a claim against a company after a bankruptcy.

The fund eliminates interest rate- and FX- risk completely by hedges that are implemented on a global fund level. This means that the interest rate- and FX-deltas are aggregated over all positions, and the aggregated deltas are then neutralized by respective derivatives that are monitored in a separate bucket. On the one hand, this management practice is efficient because there is no need to enter hedging derivative contracts for each and every position. On the other hand, it is difficult to decompose the interest rate- and FX-hedges in the separate bucket in order to obtain attributions to the single positions. The latter difficulty is precisely what can be overcome with the presented methodology, which helps to isolate the actual contribution of the single positions to the total fund's PnL, just like in the negative basis example of the previous paragraph.

Table 1 depicts the resulting performance attribution for the first quarter of 2022 from 31 Dec 2021 until 01 Apr 2022. Within this quarter there have been significant movements in interest rates and in the EUR-USD exchange rate. For instance, the interest rate part $P^{(P)}_{(t,T]}(r)$ of all positions **without** consideration of the interest rate hedge bucket amounts to -255 bps of the fund's net asset value, due to sharp interest rate increases. Similarly, a significant appreciation of the USD with respect to the EUR in the considered period implied that $P^{(P)}_{(t,T]}(\chi)$ amounts to 120 bps of the fund's net asset value. Consequently, the contributions of the two hedging buckets to the fund's performance was significant, and the attribution of this part of the PnL to the single positions is non-trivial. Especially positions with large bond exposures have had a poor performance due to rising interest rates, but these losses are compensated by the interest rate hedge bucket. Positions with a large USD exposure have had a strong performance due to an appreciation of the USD with respect to the EUR, but these gains correspond to respective losses in the FX hedge bucket. The presented methodology helps to split the significant contributions of the hedging bucket into parts associated to each single position. To this end, for each and every single position we simply compute the number $P^{(P)}_{(t,T]}(x) + P^{(P)}_{(t,T]}(\lambda)$ (minus transaction costs), which equals approximately the position's attribution to the total fund PnL **after** interest rate and FX hedge.

In Table 1, the presented interest rate hedge costs result from both transaction costs and discretization as well as approximation errors, as mentioned in Remark 2.1. It appears to be significant in the considered period, which might be explained by the fact that there have been massive interest rate changes that are difficult to hedge accurately. It could also be partially explained by our definition of $P^{(P)}_{(t,T]}(r)$ based on averaging the beginning and the end of the periods. Possibly the actual loss due to interest rate changes was not as large as indicated by our methodology, which would then explain at least a part of the discrepancy. The FX costs/discrepancy includes FX hedging transaction costs,