The influence of the decay operator on linear time series

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A lot of attention in financial mathematics literature is related to the decrease of risk and the prediction of future returns, while an important statistic, *turnover*, of an algorithmic trading strategy is often overlooked. In this research, we develop the mathematical model for *turnover* and analyze how the *decay* operator decreases its value. We precisely look at the influence of the *decay* operator on the *linear time series*. One of the key results is the following theorem.

The value of *turnover* after applying the *Linear Decay* operator of length n to a *stationary Gaussian linear time series* of order m $\vec{w} = \{w_t\}_{t\in\mathbb{Z}}$ strictly decreases the value of *turnover* in cases:

- $n > 1 \, for \, m \in 0, 1, 2$
- $n > \max(m, 1) \quad \forall m$
- $n > 1 \, for \, m \to \infty$

Also, we conduct numerical experiments on both synthetic and real market data to validate the results.