Title: **False safe haven assets: evidence from the target volatility strategy based on recurrent neural network**

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Abstract:

Targeting volatility has become very popular within the markets because it reduces the tail risk. However, during a market downturn, both the target and realized volatility might differ significantly; this leads to a worse-than-expected portfolio performance. This paper examines the efficiency of a volatility-targeting portfolio that has been enriched with safe haven assets. Our portfolio strategy utilizes recurrent neural networks (RNN) in order to forecast market volatility and applies an out-of-sample approach that mimics the real financial market circumstances. We consider 13 assets; including long-term government bonds, commodities, gold, and other precious metals as a safe haven to the S&P500 index and verify how portfolios that combine an index, an asset, and cash perform in terms of the Sharpe and Calmar ratio. Other indices, NIKKEI225, NIFTY50, and STOXX50, are examined for robustness. With analysis conducted over a 20-year sample period, we find that RNN deliver sound predictions to construct the volatility targeting strategy. Among considered assets, only long-term Treasury bonds act as a safe haven and improve the strategy performance. Other considered assets proved to have no such potential. Our findings are relevant to portfolio managers and all investors using an active approach to manage portfolio risk.