Detecting Portfolio Reallocation Timing with a Time-Series Aggregated Market Integration Index

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Abstract

This paper proposes a time-series aggregated market-integration index for detecting portfolio reallocation timing under global common-shock transmission. The index combines a Gated Recurrent Unit (GRU) network with a long-memory estimation framework, allowing nonlinear short-run dynamics to be filtered. We provide a theoretical foundation showing that a global common factor can generate and strengthen long memory property even when individual components are short-memory processes. The mechanism operating through het-erogeneous factor exposures illustrates that when global shocks are transmitted coherently through persistent asset dynamics, the aggregate series becomes more persistent. We then develop the GRU-FEAR estimator and evaluate it when compared to several existing long-memory estimation in simulations. Empirically, the resulting market-integration index provides earlier warning signals than two widely used systemic-risk indicators, COVOL and RORO, in several major market-stress episodes. In out-of-sample stock-return forecasting, forecasts using d_index improve over historical-mean benchmarks and outperform forecasts based on COVOL and RORO in the main U.S. index exercise across conservative-slope and machine learning models. The results provide evidence for the usefulness of GRU-FEAR as an inter-pretable and operational tool for portfolio reallocation under global common-shock transmission