Dynamic Asset Allocation - Identifying Regime Shifts in Financial Time Series to Build Robust Portfolios - DTU Orbit (24/08/2019)

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Long-term investors can often bear the risk of outsized market movements or tail events more easily than the average investor; for bearing this risk, they hope to earn significant excess returns. Rebalancing periodically to a fixed benchmark allocation, however, is not the way to do this. In the presence of time-varying investment opportunities, portfolio weights should be adjusted as new information arrives to take advantage of favorable regimes and reduce potential drawdowns. This thesis contributes to a better understanding of financial markets’ behavior in the form of a model-based framework for dynamic asset allocation. Regime-switching models can match financial markets’ tendency to change their behavior abruptly and the phenomenon that the new behavior often persists for several periods after a change. Regime shifts lead to time-varying parameters and, in addition, the parameters within the regimes and the transition probabilities change over time. Using recursive and adaptive estimation techniques to capture this, we are able to better reproduce the volatility persistence that dynamic asset allocation benefits from. With this approach it is sufficient to distinguish between two regimes in stock returns in order for it to be profitable to change asset allocation based solely on the inferred regimes, both in a single-asset multiaset universe. We advocate the use of model predictive control for translating forecasts into a dynamic strategy and controlling drawdowns by solving a multi-period optimization problem. We implement this based on forecasts from a multivariate hidden Markov model with time-varying parameters. Our results show that a substantial amount of value can be added by adjusting the asset allocation to the current market conditions, rather than rebalancing periodically to a static benchmark. By proposing a practical approach to drawdown control, we demonstrate the theoretical link to dynamic asset allocation and the importance of identifying and acting on regime shifts in order to limit losses and build robust portfolios.

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