

Project Summary

This research investigates international asset allocations using a novel statistical model that incorporates correlation breakdown which leads to elaborate regime switches. A “good” model, at the very least, must include persistent time-varying correlations in addition to regime switches if it is to reproduce most of the other stylized facts of asset returns.

This project consists of two stages. The first stage will inquire into “optimal asset allocation under regime switches.” Here, I will first solve the portfolio selection problem defined by continuous-time regime-switching models (RSMs). Within this class of models, the return generating process is a function of a discrete state process. In each state, the returns are drawn from a different geometric Brownian motion. The state process thereby generates a stochastic opportunity set. Thus investors hold an intertemporal hedge portfolio under regime-switching models. I will present two models which differ only by the information the investors have on the active regime. The first model assumes that investors have full information on the active regime. The second model treats the state process as hidden and investors must infer the probability of the regimes being active. The first-order conditions in this second case cannot be solved in closed-form; so I will resort to Monte-Carlo simulation to obtain the optimal weights. Then I will develop numerical algorithm to investigate the empirical portfolios of RSMs and their performance in an out-of-sample horse race.

In the second stage, I will tackle “international asset allocations under regime switches.” The RSMs constructed in the first stage will be applied to three stock markets. I will provide evidence on the existence of correlation breakdown in international stock return data and use this to motivate the choice of RSMs to investigate the effect of correlation breakdown on international portfolio holdings. (Both economically and statistically) significant differences among the regimes will have a potentially strong effect on optimal asset allocations. Following the first stage, I will adopt two approaches to examine international asset allocations. In the first approach, I will assume that the investors have full knowledge of the active regime and derive the resulting optimal international portfolios. In the second approach, I will assume that the state process is hidden from the investors and propose a Monte-Carlo simulation approach to solve the optimization problem with hidden regime switches. In particular I will consider a method based on a set of difference equations to solve the optimization problem for a number of assets and calculate resulting optimal portfolios. In addition I will also focus on the optimal hedging of currency risk and analyze three model specifications with each representing a particular currency hedging policy. The first specification bears full exchange rate risk, the second hedges currency risk completely, and the third specification applies an optimal hedging policy. The performances of the three model specifications will be evaluated against a domestic and an international benchmark model with one regime. Then I will evaluate the performances by adopting two approaches. In the first approach, I will calculate the compensations required to make an investor indifferent between an optimal strategy and a sub-optimal strategy. In the second approach, I will perform an out-of-sample horse race to test the strategies in real market situations. With this particular setup of RSMs and linear benchmark models, I will be able to investigate a number of important and, in some cases, open questions in Finance; that is, this setup will enable me to evaluate the benefit of international diversification, investigate the effect of regime switching on optimal weights and performances, study the optimal currency hedging policy, and investigate the optimal level of foreign investments and relate it to so-called home-bias puzzle.

Budget is requested for a PhD student (Shan Chen) and a Master student (Yuan Ma).