Robust Statistics and Robust Approaches for Portfolio Selection: Overview

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1 Robustness in Finance

- Two related research fields on robustness:
  
  — Modelling preferences for robustness and robust decision processes of agents that take into account some forms of model misspecification in their decisions

  — Developing robust statistics for the econometric analysis of financial time series using models that are possibly misspecified
1.1 Portfolio Selection: Merton’s Type Robust Models

- Continuous-time reference model for asset prices (for instance GBM)

- Neighborhood of absolutely continuous misspecifications of the reference model

- Preference for robustness determines the relevant model "neighborhood"

- Portfolio solution through Max-Min expected utility approach

1.2 Superhedging under Bounded Volatilities

- No explicit reference model for asset price (volatility) dynamics

- Neighborhood of (not necessarily absolutely continuous) model mis-specifications implied by some volatility bounds for the underlying’s process

- Superhedging through maximization of expectations on a set of martingale measures satisfying the given volatility conditions

1.3 Robust Statistics/ Econometrics

- Reference model for asset prices (for instance conditional normality)

- Neighborhood of $\varepsilon$—contaminations of the given reference model

- Bound on contaminating probability $\varepsilon$ fixes the relevant neighborhood

- Maximization of a statistical objective function (e.g. expected pseudo log likelihood) subject to a robustness constraint

1.4 Wanted:

- Robust procedures that take into account model misspecifications both
  — when determining optimal policies in financial models
  — when estimating the parameter inputs for a financial model

- Procedures incorporating jointly Estimation Risk and Model Risk in financial decision making!
2 Structure of the Lectures

- Part I (Cavadini, Sbuelz and Trojani (2001))
  - Simple application of robust statistics that incorporates Estimation and Model Risk (ER and MR) in mean variance portfolio choice by some pseudo risk aversion corrections

- Part II (Trojani and Vanini (2001a, 2001b, 2001c))
  - Presentation of a few continuous-time robust models of intertemporal consumption and portfolio choice
  - Description of a perturbative approach to obtain approximate analytical solutions