

Statistics 434: Bullet Points for Day 12

Martingales: The Most Important Stochastic Processes

At the first level, martingales are simple mathematical objects that help us understand fair games, including the impossibility of effective gambling systems. It's not traditional to discuss martingales in the context of time series, but it is a mistake not to do so. While it is true that there is not much "estimating" or "fitting" to be done with martingales, they have higher virtues. In particular, they greatly enrich the conversation about asset returns.

- Random Walks — the First Martingales
- Formal Definition of Martingales
 1. Understanding Conditional Expectation
 2. Understanding Increasing Information
- Placing Your Bets: The Martingale Transform
 1. The Impossibility of Gambling Systems
 2. Doob's stopping time theorem
- Martingales and Two famous Ruin Formulas
 1. Ruin formula for simple random walk
 2. Ruin formula for biased random walk
 3. A formula for the duration of a game
- Martingale as tool for framing the EMH
- Martingale — no tests offered, and for good reasons
- Historical Data: It's all we've got but its not enough

QUOTE OF THE DAY

"History may not repeat itself, but it rhymes." — Mark Twain