Capturing the Market Stylized facts with the Quintic Ornstein Uhlenbeck Volatility Model

immediate

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1 Project Outline

- Part I: understanding stylized facts of SPX/VIX
- Part II: analysis of stylized facts with real market data
- Part III: analysis of stylized facts generated/missing from the quintic OU model and identify possible improvements/remedies
- Part IV: pricing and hedging with (improved) quintic model via Fourier, volatility prediction

1.1 Part I: understanding stylized facts of SPX

The aim of Part I is to familiarize with stylized facts of SPX and VIX markets identified in the literature, focusing on path-dependent stylized facts.

Below is a (non-exhaustive) list of path-dependent stylized facts:

- Slow decay of auto-correlation in absolute returns
- Long range dependence/memory of volatility
- Presence of multi-timescales
- Is volatility really "rough"?
- Zumbach effect and time reversal asymmetry

Here are some references to get you started:

Rough volatility and Zumbach effect: [5, 7, 6, 10, 11, 4, 3]

long range dependency and presence of multi-timescales: [1]

slow decay of auto-correlation in absolute returns: [9]

Other useful references: [2, 8]

1.2 Research Tips

Research is exciting, but can be overwhelming at times. Here are some tips and tricks I have learned in the last couple of years when reading through research literature:

- quickly scan through the article and identity relevant sections during the initial read;
- do not aim to understand everything in an article, instead try to get a general idea of the main contribution of the article (e.g. main results, main theorems, idea of the algorithm...) first and deep dive later if needed;
- ask for help - we are here to guide you through the project and also to learn from each other :)

References

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