

Statistical Mechanics in Econophysics and Social Systems

Federica De Domenico

Women in Theoretical Physics



Econophysics

- Interdisciplinary research field
- Name introduced in 1995
- Financial markets as complex systems

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with $S(t)$ asset price at time t , μ percentage drift, σ volatility, ξ_i random number drawn from non-Gaussian distributions.

Non-Gaussian models:

Student's t , q -Gaussian, Modified Weibull, Truncated Lévy distributions

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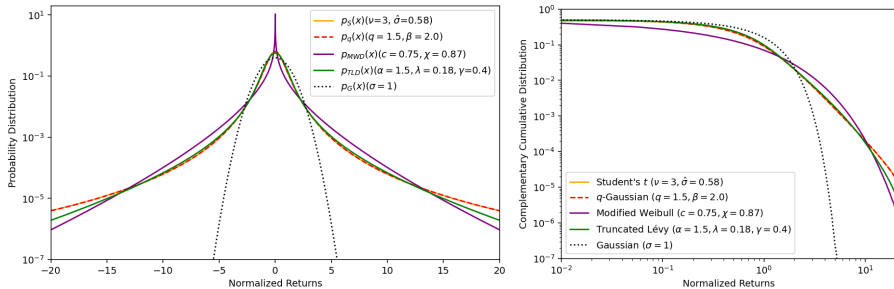
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Goal	a systematic comparison
Strategy	standardization, accurate choice of parameters
How	Monte Carlo simulations

Results

F. De Domenico et al., *Modeling and Simulation of Financial Returns under Non-Gaussian Distributions*, Physica A



Left panel: comparison between standardized non-Gaussian return distributions and the Gaussian (dotted line) for normalized returns. Right panel: Log-log scale comparison between the complementary cumulative distribution function of standardized non-Gaussian return distributions and the Gaussian one (dotted line) for normalized returns.

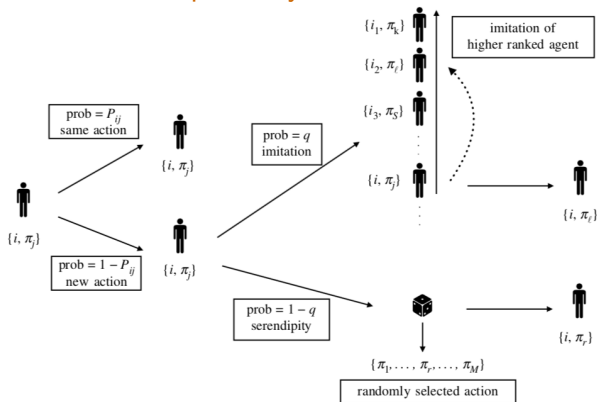
Dynamics in Complex Systems

- Finance and social systems
- Discrete or continuous framework
- Probabilistic description \rightarrow probability distribution function
- Power laws

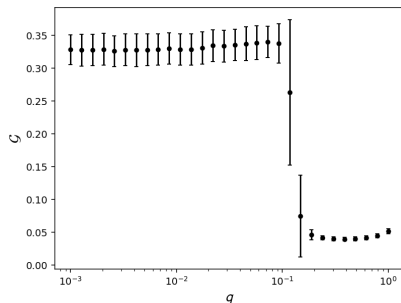
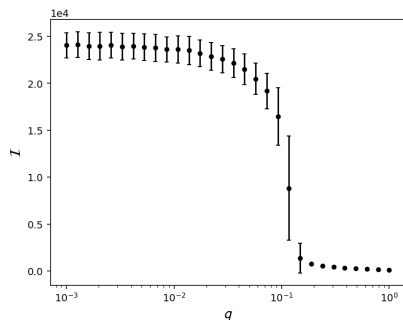
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Opinion dynamics



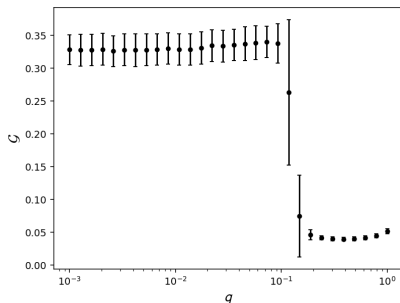
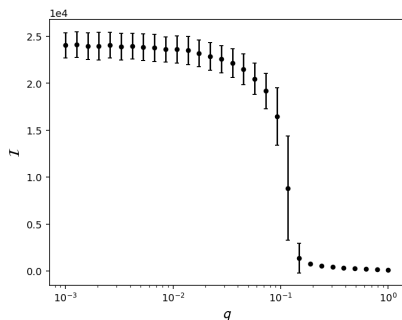
Preliminary results



F. De Domenico, F. Caccioli, G. Livan, G. Montagna, O. Nicosini, *paper in preparation*

- $q \rightarrow 1 - q$
- Academic impact and Gini coefficient

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Thank you for the attention!