

The Dow Jones Industrial Average and the birth rates in Scotland: A multifractal view

Peter Dojnow¹, Ivan Jordanov²

¹Institute of General and Inorganic Chemistry
Bulgarian Academy of Sciences, Sofia, Bulgaria
Dojnow@svr.igic.bas.bg

²University of National and World Economy, Sofia, Bulgaria
Institute of Mechanics, Bulgarian Academy of Sciences, Sofia, Bulgaria
i_jordanov@email.bg

Keywords: Population dynamics, The Dow Jones Industrial Average, Multifractal auto- and crosscorrelation time-series analysis.

The state of the economy has an influence on the birth rates and vice versa. The Dow Jones Industrial Average (DJIA) is a basic indicator not only of the US economy but also of the world economy and the investigation of its change with the contemporary methods for multifractal analysis such as MDFA is applied to find out multifractal characteristics and to determine the correlations of the index, its amplitude and phase and they are compared to the birth rates in Scotland. Since the DJIA is nonstationary then for the drawing out of the dynamics of the multifractal parameters a modified MDFA is used. The obtained values of the correlation exponent $h_2 \sim 1.5 \pm 0.2$ are of the Brownian motion process, related with the economy in this case. Alterations of the multifractal parameters and the births during the world wars, the economical collapses in 1929, 1987 and other years, also after changes in the economical policy have been revealed.

Acknowledgments. This work contains results, which are supported by the UNWE project for scientific researchers with grant agreement No. NID NI - 21/2016.

References

- [1] A. Maddison, *The World Economy Volume 1: A Millennial Perspective Volume 2: Historical Statistics*, Academic Foundation, 2007.
- [2] J. Kantelhardt, S. Zschiegner, E. Koscielny-Bunde, S. Havlin, A. Bunde, H. Stanley, *Multifractal detrended fluctuation analysis of nonstationary time series*, *Physica A: Statistical Mechanics and its Applications*, **316**(1-4) 87–114, 2002.