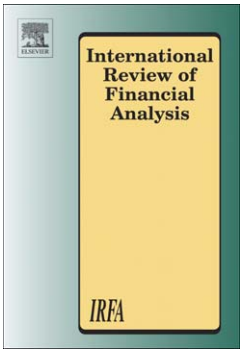

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Breaking down the barriers between econophysics and financial economics

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Abstract

This article highlights the current misunderstanding between economists and econophysicists by adopting the financial economists' viewpoint in order to explain why the works developed by econophysicists are not recognized in finance. Because both communities do not share the same scientific culture, and for the other reasons developed in the article, economists often consider econophysics as a strictly empirical field without theoretical justification. This paper shows the opposite; it also tries to facilitate the dialogue between econophysicists who often do not explain in details their theoretical roots and financial economists who are not familiar with statistical physics. Beyond this clarification, this paper also identifies what remains to be done for econophysicists to contribute significantly to financial economics: 1) development of a common framework\vocabulary in order to better compare and integrate the two approaches; 2) development of generative models explaining the emergence of power laws; and 3) development of statistical tests for the identification of such statistical regularities.

Keywords
Statistical physics applied to finance; Power laws; Interdisciplinarity; econophysics; financial economics and econophysics

1. Introduction

Econophysics is a recent field that dates back to the 1990s; it applies theories\methods developed by physicists and associated with the physics of complex systems in order to study complex (nonlinear) problems in economics (Daniel & Sornette, 2010; Jovanovic & Schinckus, 2013; Săvoiu & Andronache, 2013). Because physics is a science dealing with a great number of natural issues (matter, energy, light etc.), it potentially offers a wide variety of conceptual tools for studying economic phenomena. Based on the success of the first works in econophysics dedicated to the statistical characterization of fat-tails in financial distributions, the existing literature often associates econophysics with statistical physics applied to finance. Although econophysics cannot methodologically be reduced to this application[1], this area of knowledge contributed to the crystallization and to the institutionalisation of econophysics (Gingras & Schinckus, 2012).

Since the birth of econophysics, a huge literature has been published and many results have been provided in finance (Bouchaud et al., 2002; Gabaix, 2009; Lux, 2009; McCauley, 2009; McCauley et al., 2007; Potters & Bouchaud, 2003; Sornette, 2014). However, in spite of the numerous publications and of the econophysicists' conviction about their potential contributions to finance, this approach seems to have great difficulties for convincing financial economists. While numerous explanations

[1] The application of statistical physics to economics also deals with corporate revenue (Okuyama et al., 1999), the emergence of money (Shinohara & Gunji, 2001), or global demand (Donangelo & Sneppen, 2000).