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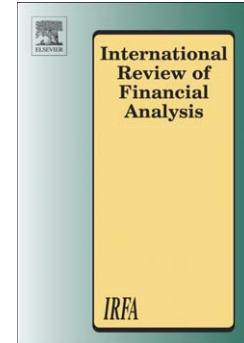
On the "usual" misunderstandings between econophysics and finance: Some clarifications on modelling approaches and efficient market hypothesis

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## On the “usual” misunderstandings between econophysics and finance: Some clarifications on modelling approaches and efficient market hypothesis

### I) Introduction

This article is a contribution in line with the recent research aiming to increase the dialogue between physicists (particularly econophysicists) and financial economists (Ausloos, 2001, 2013; Bouchaud, 2002; Bouchaud et al., 2002; Carbone et al., 2007; Chakrabarti & Chakraborti, 2010; Chen & Li, 2012; Durlauf, 2005, 2012; Farmer & Lux, 2008; Gabaix, 2009; Jovanovic & Schinckus, 2015, 2016; Keen, 2003; Lux, 2009; McCauley, 2006, 2009; McCauley et al., 2007; Potters & Bouchaud, 2003; Sornette, 2014; Stanley & Plerou, 2001). Actually, a recent article by Sornette (2014) offers a titillating example of largely widespread confusions about the distinction between econophysics and financial economics. We claim here that the cross-fertilization between econophysics and financial economics requires an objective clarification of both approaches in order to open the door for an interdisciplinary and fruitful dialogue.

The misunderstanding evoked above seems to be rooted in the difference, pointed out by Sornette (2014), between the way of modelling in economics and how it is done in physics, which is broadly resumed by the “*difference between empirically founded science and normative science*” (Sornette, 2014, p. 3). As explained,

“The difference between [the model for the best estimate for the fundamental price from physics] and [the model for the best estimate for the fundamental price from financial economic, i.e. efficient market theory] is at the core of the difference in the modeling strategies of economists, that can be called top-down (or from rational expectations and efficient markets), compared with the bottom-up or microscopic approach of physicists” (Sornette, 2014, p. 7).

This distinction between the ways of modelling provides the corner argument for explaining the major differences between the two disciplines. Actually, this opposition is also used for claiming that modelling in economics can be looked on as a “puzzle” which

“refers to problems posed by empirical observations that do not conform to the predictions based on theory” (Sornette, 2014, p. 5).

In order to give up such a kind of puzzle, Sornette (2014, p. 7) suggested to use this distinction for formulating an (econo)physics definition of the efficient market hypothesis (EMH) compatible with the bottom-up approach. We thoroughly re-examine this “solution” from a fundamental conceptual way and from a critical analysis of the EMH.

This dualist perspective (top-down vs. bottom-up) is frequently found in the econophysics literature (Bouchaud & Challet, 2014; Bouchaud & Potters, 2003; Challet et al., 2005, p. 14; McCauley, 2004, 2006; Rickles, 2008; Schinckus, 2010; Stanley et al., 1999, p. 157). It is also a common argument for questioning the use of the Gaussian framework in a large number of financial economists’ works. However,

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