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**Reply to “Comment on “Econophysics and economics: sister disciplines?”
by Allan Walstad**

Walstad offers an interesting comment about my editorial devoted to the contrast between econophysics and economics.¹ He proposes some methodological arguments to show that economics and econophysics are not as different as I had written. Although Walstad’s arguments about economic methodology are not necessarily false, they are vague, and should be clarified.

According to Walstad, econometrics is evidence of the empirical dimension of economics. Strictly speaking, empiricism refers to a methodology in which all hypotheses and theories must be tested against observations of the natural world, rather than resting only on *a priori* reasoning, intuition, or revelation. However, econometrics is based on the collection of data, which is not enough to really be empirical. Econometrics is based mainly on a Gaussian framework and when econometricians observe some abnormal data (data statistically outside a Gaussian distribution), they use data mining to ensure that all abnormal data have an expected mean equal to zero.² With this perspective they assume a specific *a priori* behavior about economic phenomena. In contrast, econophysicists do not use data mining and strongly reject this kind of “*a priori*ism.”³ For econophysicists, there is no “abnormal data,” but only data about reality. That is why I consider that in comparison to econophysics, econometrics is not an empirical field.

For Walstad, economics (and econometrics) is consistent with the empiricist manifesto by Milton Friedman.⁴ Although mainstream economics is often said to be based on his empiricist methodology, this claim is vague. According to Friedman, a theory must provide good predictions to be accepted, otherwise it must be rejected. Predictions provided by econometrics are often called into question in the economics literature⁵ and, moreover, predictions about the evolution of financial prices provided by econophysicists are usually better.⁶ From the empiricist point of view developed by Friedman, econophysics is more empirical than econometrics.⁷

Walstad writes that economics and econophysicists use the same atomistic approach. Economics is fundamentally based on methodological individualism and economists only focus on static characteristics of individuals by analyzing their behaviors in terms of personal elements (such as utility function and risk aversion). All these elements are personal and static in the sense that they do not cause interactions. Individuals are assumed to be totally “disembedded”⁸ from the system in which they act. Mainstream economists focus on the individuals without taking into account the interactive properties of these individuals, whereas econophysicists reject the personal characteristics of the individuals and focus on properties that imply interactions between individuals, which lead to the observed macroscopic phenomena. Contrary to economists, econophysicists assume that individuals have some interactive properties that can be studied in a macroscopic perspective.

I agree with Walstad when he writes that the scope of the economic mainstream is broader than that of econophysics. Econophysics mainly focuses on financial economics,

although some work exists on macroeconomics.⁹ Econophysics is a new field and needs more time to influence other subfields of economics.

Walstad writes that economists and econophysists have in common their focus on mathematical modeling at the expense of a realistic depiction of human action. That is a good point. But there is a deep difference in the way models are used. Although economists use models as tools to describe what they call a “normal situation”¹⁰ (a Gaussian point of view), econophysicists use models in a describing perspective without having an a priori framework in mind.

Walstad reminds us of the existence of an economic tradition that explores the consequences of individual human choice in the pursuit of goals and purpose. As he mentions, this tradition explicitly refers to the notion of instability. Two points must be emphasized here. First, the Austrian framework is not the dominant paradigm of economics, and my comparison of econophysics and economics refers to the mainstream of economics (that is, neoclassical economics). The second point is that the notion of instability used by Austrian economists is very different from the notion of instability used in econophysics. Austrian economists consider instability to be the result of human decisions (which could be avoided), and econophysicists consider instability as the result of human actions. For econophysicists, instability is a specific dimension (in contrast to the key concept of equilibrium in economics) of complex reality and cannot be avoided. Austrian economics is very far from econophysics: the Austrian approach considers economics as an a-priorist discipline that provides some explanations of human behaviors through introspection. In this perspective, this tradition explicitly rejects the empirical and statistical approach in economics, suggesting that this kind of methodology is more appropriate in the natural sciences where factors can be isolated in laboratory conditions.¹¹

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¹C. Schinckus, “Econophysics and economics: Sister disciplines?,” *Am. J. Phys.* **78** (4) , 325-327 (2010).

²B. Mandelbrot, *The Misbehaviour of Markets* (Basic Books, New York, 2004).

³J. McCauley, “Response to ‘Worrying trends in econophysics,’” *Physica A* **371**, 601–609 (2006).

⁴M. Friedman, “The methodology of positive economics,” in M. Friedman, *Essays in Positive Economics* (University of Chicago Press, Chicago, 1953), pp. 1-40.

⁵R. Backhouse and M. Morgan, “Is data mining a methodological problem?,” *J. Economic Methodology*, Special Issue, **7** (2) (2000).

⁶B. Roehner, *Patterns of Speculation: A Study in Observational Econophysics* (Cambridge University Press, Cambridge, 2002).

⁷Several authors have argued that the empirical dimension of economics (and econometrics) is mainly a matter of rhetoric See L. Boland, *The Methodology of Economic Model Building: Methodology after Samuelson* (Routledge, London, 1989), or L. Boland, *Critical Economic Methodology* (Routledge, London, 1997).

⁸M. Granovetter, “Economic action and social structure: The problem of embeddedness,” *Am. J. Sociology* **91**, 481-510 (1985), or C. Schinckus. “The importance of communicative rationality on financial markets,” *J. Economic and Social Research*, forthcoming.

⁹ While some of econophysicists describe the emergence of money as the macroscopic result of complex interactions between individuals (Shinohara S. & Gunji Y., “Emergence and collapse of money through reciprocity”, *Applied Mathematics and Computation*. 117, 131-150, 2001) other explain that the evolution of global demand can be describe as the evolution of a complex system (Donangelo R. & Sneppen K., “Self-organization of value and demand”, *Physica A*, 276, 572-580, 2000).

¹⁰J. McCauley, *Dynamics of Markets: Econophysics and Finance* (Cambridge University Press, Cambridge, 2004).

¹¹ L. von Mises, *Nationalökonomie* (Geneva: Union, 1940).