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Is econophysics a new discipline? The neopositivist argument

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ABSTRACT

Econophysics is a new approach which applies various models and concepts associated with statistical physics to economic (and financial) phenomena. This field of research is a new step in the history and the evolution of Physics Sciences and the question about the disciplinary characteristics of this field must be asked. At first glance, it might appear that economics and econophysics share the same subject of research (that of analysis of economic reality). In this paper I will use neopositivism to show that econophysics is methodologically very different from economics and that it can be considered as a separate discipline. The neopositivist framework provides econophysics with some arguments for rejecting mainstream economics.

0. Introduction

Econophysics, which emerged over a decade ago, applies various models and concepts imported from condensed matter and statistical physics to analyze economic and financial phenomena. This new field of research has generated a lot of methodological debate [1–5]. It is often presented as a positivist discipline [6,7] that provides a more empirical basis to economics [8–10].

Despite the novelty of this new approach, more and more papers about econophysics have been published in journals devoted to Physics and Statistical Mechanics. Several meeting series[1] dedicated to this topic are regularly organized and moreover, new Ph.D. programs in Econophysics recently appeared in some universities.[2] Nowadays, Econophysics appears to be a new step[3] in the history and the evolution of Physics Sciences and then the question about the disciplinary characteristics of Econophysics must then be asked.

In this paper I will use the term neopositivism to show that econophysics is epistemologically very different from economics and that it can therefore be considered a separate discipline. From this perspective, I will show that econophysicists did indeed develop some positivist arguments, both to criticize neoclassical economics and to implicitly justify the autonomy of their field. The final part of this paper will emphasize the main methodological differences between econophysics and economics that result from the neopositivism approach developed by econophysicists.

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1 See Nikkei Econophysics Research workshop and symposium (from 2001 to 2004); "Application of Physics in Financial Analysis" (from 1999 to 2006) or the still active events : The Econophysics Colloquium and the Econophys-Kolkata Conference.

2 See University of Houston (http://phys.uh.edu/research/econophysics/index.php) or University of Melbourne (http://physics.unimelb.edu.au/Community/Newsroom/News/Econophysics-scholarship-available) and see Ref. [11] about the organization of B.Sc. and M.Sc. in Econophysics at the university of Warsaw.

3 *Because econophysicists stop to investigate inert matter but they focus their works on human actions.*

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1. Econophysics: a new paradigm or a new discipline?

Econophysics is a hybrid discipline (the name[4] of which results from the contraction of "economics" and "physics") that applies various models and concepts originating in physics to economic (and financial) phenomena. At first glance, econophysics could appear to be just the importation of a wide variety of physical models into economics. However, a more methodological approach would define it as a "quantitative approach using ideas, models, conceptual and computational methods of statistical physics" [13, p. 1]. A similar definition of econophysics is given by Mantegna and Stanley [14, p. 355]:

> "The word econophysics describes the present attempts of a number of physicists to model financial and economic systems using paradigms and tools borrowed from theoretical and statistical physics".

Econophysics presents itself as a new way of thinking about the economic and financial systems through the "glasses" of physics. As much as classical economics imported models from classical physics as formulated by Lagrange[5], and financial economics built on the model of Brownian motion imported from physics, so, econophysics wants to model economic phenomena using analogies taken from modern condensed matter physics and its associated mathematical tools and concepts. Also, whereas main stream micro economics is based on the rational behavior of individuals, econophysics focuses on interactions between actors that lead to the emergence[6] of statistical macro-laws which are typically power laws instead of Gaussian ones as expected in classical economics. This approach is directly in line with the development of so-called "complexity science" during the 1990s for which economic systems are an obvious candidate for a treatment in terms of "complexity" because they are composed of multiple components (agents) interacting in such a way as to generate the macro-properties of economic systems and subsystems [2, p. 2].

Econophysics relates to physical complexity since it considers economic systems as complex systems whose internal microscopic interactions can generate macroscopic properties. These complex systems are then statistically expressed and their principles (microscopic models, Ising model, scaling laws etc.) are used to develop models explaining how emergence appears at the macro-level of complex economic systems.

Is econophysics a new discipline or is it just a new paradigm within the pre-existing discipline of economics? I will analyze this question below, using a neopositivist approach. Before showing how econophysicists can claim to have developed a new positivist discipline, I will present the main features of neopositivism.

2. Neopositivism and the Vienna Circle

Neopositivism (also known as logical positivism) is a philosophical movement that originated in a group called the First Vienna Circle in Austria and Germany during the 1920s. This school of philosophy "combines empiricism, the idea that observational evidence is indispensable for knowledge of the world, with a version of rationalism incorporating mathematical and logico–linguistic constructs and deductions in epistemology" [18].

Despite the pluralism of the Vienna Circle's views, there was a minimal consensus about the theory of knowledge: the purpose of science was seen as being to describe what can be observed and measured [19]. Neopositivists believe in a logical empiricism and the idea that observations are the core of all scientific research. Given this empiricism, the neopositivist framework calls into question the separation of the natural and human sciences: whatever the field of research, scientific knowledge should be empirically founded and logically true.

A framework connecting logic and empiricism was developed by one of the leading authors of the Vienna Circle, Carnap [20,21], who worked on two kinds of statements: analytic and synthetic. Analytic statements are propositions whose predicate concept is contained in their subject concept. They are true or false by virtue of their logical forms. These a priori statements are true by definition, and they do not express factual truths, but rather ways of representing the world. Synthetic propositions are not axiomatic since predicate concepts are not contained in their subject concepts. The truth or falsehood of these statements can only be determined by means of experiments. If such a posteriori propositions fail their tests they are considered to be cognitively meaningless and they give rise only to pseudo-problems. Synthetic a priori statements are therefore rejected by positivists because they lead to the creation of knowledge without an empirical base.

The links between logic and empiricism emerge through the notion of observability, for which Carnap [21, p. 226] gave two definitions:

> "To a philosopher, 'observable' has a very narrow meaning. It applies to such properties as 'blue', 'hard', 'hot'. These are properties directly perceived by the senses. To the physicist, the word has a much broader meaning. It includes any quantitative magnitude that can be measured in a relatively simple, direct way".[7]

[4] The official birth of the word 'Econophysics' dates to a paper by Stanley et al. [12].

[5] See Ref. [15].

[6] Let us mention that some authors (Israel [16] or McCauley [10]) who argued that the dynamic complexity idea of emergence is empty and should be replaced by a more physics-based concept of invariance — Rosser [17]. showed that this distinction between the two is irrelevant (it results from the old methodological struggle between the continuous and the discrete).

[7] Nowadays, this definition of observability needs to be qualified since the evolution of knowledge and instruments in Physics — This definition must then be used in a neopositivist framework.

The definition of observability proposed by Carnap suggests two kinds of terms: observable terms (blue, hard, temperature etc.) correspond to observable properties or relations, while theoretical terms (electrons, molecules) refer to unobservable properties (or relations). These two categories of statements determine scientific knowledge through a collection of empirical laws (synthetic statements) and theoretical laws (analytic statements).

The idea of empirical laws is very easy to understand since they are "laws containing terms either directly observable by the senses or measurable by relatively simple techniques" [22, p. 337] Scientists make repeated measurements, and when they find certain regularities, they express them in empirical laws. The notion of a theoretical law is more abstract because it refers to unobservable terms that must, however, have an empirical justification. Carnap [21] reminded us what he meant when he made the distinction between these two categories of laws:

> "A theoretical law is [...] distinguished from an empirical law [...] by the fact that it contains terms of a different kind. The terms of a theoretical law do not refer to observables even when the physicist's wide meaning for what can be observed is adopted. They are laws about such entities as molecules, atoms, electrons, protons, electromagnetic fields, and others that cannot be measured in simple, direct ways"[8] [21, p. 227].

Despite the unobservable character of their terms, theoretical laws must be empirically founded. That is a central point for positivists. For positivists, all scientific laws must have an observable consequence and be based on a logical structure in which the description of a phenomenon is embedded. The theoretical and empirical dimensions are then interlinked since the theory appears as a hypothesis with unobservable terms which are justified by the observations[9]. Unobservable terms exist only because some empirical evidences allow physicists to conclude that there is 'something' that they decide to call a 'molecule', an 'electron' etc. For neopositivists, scientific knowledge must have an empirical foundation since its objective is to describe the world as it is. All phenomena are then partially reduced to experiences and observations. This reductionism is called physicalism. It claims that statements are only cognitively significant if they can be reduced to physical states. This stance results from Wittgenstein's [23] work, and the idea that the structure of language must be a reflection of the structure of the world [24,25]. As a result, there must be one language to which all other languages could be reduced. As Carnap explained:

> "The thesis of physicalism maintains that the physical language is a universal language of science — that is to say, that every language of any sub-domain of science can be equipollently translated into the physical language. From this it follows that science is a unitary system within which there are no fundamentally diverse object-domains, and consequently no gulf, for example, between natural and psychological sciences. This is the thesis of unity of science" [25, p. 320].

I will conclude this section by emphasizing the influence of this physicalism on the way of thinking about psychology at that time. Of course, neopositivism implies a descriptive (empirically founded) psychology in which all psychological characteristics can be derived from the observation of behavior [26]. Although Carnap [27] acknowledged the existence of intuition, he subscribed to this behaviorist view of psychology.[10]

3. The positivist gap between econophysics and economics

Having presented the main characteristics of neopositivism, I will now focus my analysis on the econophysical methodology in order to see whether this field of research can be considered positivist. By using the main theoretical features of neopositivism, I will, in this section, lay out the reasons why econophysics can be considered as a new discipline.

First of all, econophysicists and economists do not share the same way of doing science. In contrast with econophysics, economics is not a positivist discipline. Although there have been some debates about the positivist dimension of economics [28,29] a consensus seems to have emerged that the positivist dimension of economics is exaggerated. By exposing the ambiguity of economic propositions, Mongin [30,31] has shown that positivism is not really the most appropriate framework to describe the economic methodology. Block [32] and Boland [33,34] have argued that the positivist stance in economics is mainly a matter of rhetoric.

The empiricist dimension is probably the first positivist feature of econophysics. According to econophysicists, complexity studies need an empirical approach [35]. Rickles [2, p. 6] explains that "the real empirical data are certainly at the core of this whole enterprise [econophysics] and the models are built around it, rather than some non-existent, ideal market [as in economics]".[11] This empirical dimension is present in a lot of econophysical works [36–38] and is often presented as the main difference with economics. Stanley et al. [39, p. 157] stress that, "in contrast to standard economics, econophysicists

8 A law about the molecules in a gas is a theoretical law, for example.

9 Here, we take into account Quine's criticisms [22] of positivism according to which logical laws give the relations between all scientific statements. In his famous paper "Two dogmas of empiricism", Quine proposed to replace positivist reductionism by a holistic perspective on science: the whole field of science and not only single statements were to be empirically verified. For Quine, it is meaningless to talk about the empirical content of a single statement because all scientific statements are interconnected.

10 See Ref. [27].

11 For debates about these oppositions between economics and econophysics, see Refs. [1,3–5].

begin empirically with real data that one can analyze in some detail but without prior models''. By starting with real data, econophysicists set the empirical dimension at the heart of complexity studies.

We can illustrate this difference between economists and econophysicists by the way they work on stylized facts such as fat tails or financial crashes. Economists consider that prices changes obey a lognormal probability distribution with a kurtosis around zero (a mesokurtic distribution). This a priori perspective implies that massive fluctuations are very unlikely. However, the real data have a positive kurtosis and thus a leptokurtic distribution in which extreme events have a greater probability. By beginning with economic and financial data, econophysicists develop models in which some extreme events (such as the financial crises of the 1980s and 1990s) can occur: a financial crash can be studied, for example, as a phase transition and particularly as a specific heat jump [40]. One of the main consequences of the positivism developed by econophysicists is that they can describe the real financial markets. This is not the case for neoclassical economics in which a financial crisis has a very small probability of occurrence.[12] Mandelbrot [41, p. 4] argued that economists' a-priori-ism leads them to under-estimate the likelihood of a financial crash: ''The standard theory, as taught in business schools around the world, would estimate the odds of that final, August 31 [1998] collapse at one in 20 million''. However, as Kahana [42]; points out, there were several financial crises during the twentieth century. Economic theory seems to be unable to describe this kind of phenomenon.

Empiricism leads to a specific perspective in which physics appears to be the main discipline appropriated to help our understanding of economic phenomena. In this framework only a physicalist language with a physical methodology should be used to describe economic complex systems, as McCauley [10, p. 7] explains,

> ''Mathematicians do work in economics but they tend to be postulatory and to ignore data [...] Chemists and biologists are trained to concentrate on details. Physicists are trained to see the connections between seemingly different phenomena, to try to get a glimpse of the big picture and to present the simplest possible mathematical description of a phenomenon that includes as many links as are necessary, but not more''.

This stance is also adopted by Refs. [4,36,10] and Bouchaud [38, p. 238] who presents it almost as a necessity:

> ''finance is becoming an empirical (rather than axiomatic) science [...] This means that any statistical model, or theoretical idea, can and must be tested against available data, as physicists are (probably better than other communities) trained to do''.

This perspective implies a rejection of economic theory (and methodology) as clearly exposed in the positivist stance adopted by Keen [36, p. 108]: ''Pivotal concepts from modern economic theory are empirically and logical flawed. Physicists should not use any of these in econophysics, and should be wary of many other models accepted by economists''. This kind of physicalism suggests implicitly that economic phenomenon can be reduced to a language coming from physics. That does not mean that every social theorist must use a physicalist language but rather that all terms used in other disciplines can be translated in terms of physics (i.e. all theoretical terms must be empirically founded). This kind of reductionism refers to the terms of science and not to scientific laws. The fact that all scientific terms can be translated into empirical stance does not imply that laws developed in others disciplines must be reduced to physicalist laws [24]. Econophysicists do not want to replace all socio-economic models by theirs — they just claim that these socio-economic models should have empirical dimension.

As mentioned above, econophysicists describe economic phenomena as complex systems and they develop models explaining how emergence appears at the macro-level of complex economic systems. Epistemologically, econophysics is founded on the observation of statistical regularities i.e. the fact that statistical properties appear and reappear in many diverse phenomena [10]. This statistical regularity can be characterized by the scaling laws that are at the heart of econophysics. As Stanley et al. [43, p. 288] express it:

> ''It is becoming clear that almost any system comprised of a large number of interacting units has the potential of displaying power-law behavior. Since economic systems are, in fact, comprised of a large number of interacting units has the potential of displaying power-law behavior, it is perhaps not unreasonable to examine economic phenomena within the conceptual framework of scaling''.

Scaling laws can be viewed as a macro result of the behavior of a large number of interacting components from lower levels. All these interacting parts are found to obey macro laws — laws which are independent of microscopic details and dependent on just a few macroscopic parameters [13]. The scaling laws are emergent properties because they do not emerge causally and their properties are not reducible to those of the sum of the components. As Kitto [7] and Mandelbrot [41] explain, scaling laws imply a complex phenomenon and they can take a variety of forms.[13]

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12 Moreover, in neoclassical theory, the very rare financial crises are caused by exogenous factors.

13 Despite this diversity, some authors often describe economic complex systems through to different kinds of power law distributions of the general form $p(x) \sim x^{-\alpha}$ (where $p(x)$ is the probability of there being an event of magnitude x and the scaling exponent can be determined either by empirically observed behavior of the system or by a theory or a simulation.). This asymptotic equality means that $p(x)$ increasingly resembles a power law as $x \to \infty$. Fat tails are often used to characterize complexity in economics (see Ref. [44]). When the parameter $\alpha = 2$, we have a normal distribution. Many socio-economic outcomes have positively skewed distributions, i.e they have longer tail to the right. These right skewed distributions often have $0 < \alpha < 1$. Let us mention that some authors reserve the term 'fat tail' for distributions where $0 < \alpha < 2$ (see Ref. [45]).

From a positivist perspective, scaling laws can be seen as either ''structural laws'' [46, p. 6] or theoretical laws (in a Carnapian sense) describing the structure of the observed phenomena. They are theoretical laws whose unobservable terms (complexity and emergence) create sufficient empirical evidence to give them a cognitive meaning. Like the existence of a magnetic field, complexity and emergence are not directly observed, but the empirical observations allow their existence to be inferred. Complexity and emergence are not logically deduced from the scaling laws because the explanation provided by econophysics is not strictly deductive but rather 'deductive-statistical' [46, p. 5]. If complexity and emergence were logically deduced these notions would be purely analytic; in fact they are indirectly confirmed by experience. This empirical evidence of emergence allows econophysicists to conceptualize some macro-economic phenomena.

The real world is not Gaussian. That is the reason why econophysicists have decided to use a more descriptive framework. By using a leptokurtic distribution they imply that extreme events have a significant probability of occurring. All the potential instabilities observed in the complex system are thus taken into account in the econophysical approach. This is not the case in economics, where stability is theoretically ensured by the Gaussian framework that describes the theoretical impossibility of the occurrence of extreme events. How, then, can economists explain a financial crash when it appears?

The use of scaling laws in econophysics also implies a specific kind of reductionism. Both economics and econophysics embody a particular reductionism [47]. While economic theory is based on an atomistic reductionism in which reality must be explained in terms of a rational representative agent, econophysics is based on an interactive reductionism where complex phenomena can be described through interactions between their parts. This distinction is very important because it has some empirical implications: by basing all economic macro-phenomena on the rational representative agent, economists implicitly set the macro-level equal to the micro-level. The consequence is that all macro-concepts (e.g. the market, systemic risk, and a financial crisis) are misunderstood in economic theory. From this perspective it is simply impossible to describe (and understand) an economic crisis such as the one the world faced in 2008. On the other hand, econophysicists focus their works on interactions between the overall complex system and its parts. Since economic activity is, in essence, interactive, this perspective is more appropriate for understanding the connections between the various parts of economic systems (firms, banks, households, etc.). From this perspective, the analysis of a crisis phenomenon (and its repercussions on investment or consumption) becomes possible.

Another difference between econophysicists and economists lies in the psychological hypotheses about agents that they adopt. In neoclassical theory, rationality appears to be a fundamental cause of agents' behavior [48,49]. From this perspective, all macro phenomena result from a homopathic causality (where the total effect of several causes acting in concert is identical to what would have been the sum of the effects of each of the causes acting alone [50]).

Econophysicists do not care for the rational-agent theory. By considering that the market components (traders, speculators, hedgers etc.) obey statistical laws, most econophysicists avoid engaging with the difficult task of theorizing the individual behavior of investors. As stressed by McCauley [10] and Brandouy [51, p. 121] all the potential causes that could explain individual economic behavior are too complicated and sophisticated to be studied. In accordance with Carnapian doctrine (the importance of observability) only the macro-level of the system can be scientifically observed and analyzed. Economic and financial systems consist then of a large numbers of components whose interactions generate observable emergent properties (scaling laws) totally independent of microscopic details (individual behavior). These emergent properties are based on heteropathic causality [52], because they cannot be characterized merely by the sum of individual behaviors.

Mainstream economists have developed abstract models with many unrealistic restrictions in order to ensure the theoretical stability of the models. The most important thing for them is to develop models that embody the equilibrium paradigm. They have an a priori model and they do not hesitate to shape their analysis to find their a priori principles in reality.[14] This is not the case with econophysicists. They do not develop a priori abstract models but prefer data-driven models that are developed to describe (and then to manipulate) economic reality: while economists try to invent economic reality, econophysicists try to describe it.

4. Econophysics as a new discipline: the neopositivist argument

For two decades a diversification of knowledge has been observed in economics. A growing number of protest groups within academic economics emerged and several non-neoclassical journals[15] campaign for empirical realism within economics. Econophysicists have then allies within economics with whom they should become acquainted. Despite the emergence of these new theoretical frameworks, economics appears as a conservative novelty-producing system since it rewards intellectual innovation only if it is directly in line with the dominant research. All new fields that are not in accordance with the scientific standards used by the mainstream are simply ignored or marginalized [55]. Gingras and Schinckus [56] showed that this marginalization is also observed with the emergence of econophysics.

14 See, for example, Sharpe's famous capital asset pricing model (which, according to McGoun [53] can be considered a pillar of modern finance). When he developed this, Sharpe [54, p. 34] explained that ''Needless to say, there are highly and undoubtedly unrealistic assumptions. However, since the proper test of a theory is not the realism of its assumptions but the acceptability of its implications, and since these assumptions imply equilibrium conditions which form a major part of classical financial doctrine, it is far from clear that this formulation should be rejected''.

15 As, for example, the Journal of Social Economy, the Review of Political Economy, the Journal of Economics Issue or the Journal of Post Keynesian Economics.

Econophysicists disapprove of the a priorist approach of economic theory. Challet et al. [57, p. 14] explain that "Physicists feel uneasy about several pillars of mainstream economic theory [...]. This approach looks too axiomatic and formal to deal with complex systems". According to Keen [36], all the key concepts (utility, perfect rationality, perfect competition etc.) used in modern economic theory are "nonsense". They are unobservable terms without an empirical base. These key concepts can be tested (experiments exist in economics, see Ref. [58]) but they cannot be directly confirmed: they are all "empirically flawed" [36]. Despite the main neoclassical concepts being often "formulated in a positivist vein, they are, in principle, subject to empirical refutation [...] we find a considerable number of violations of the revealed preference axioms which contradicts the neoclassical theory" [59].

From a positivist point of view, econophysicists reject neoclassical economic theory because economists provide synthetic a priori propositions [25]. Economic statements are indeed synthetic because, although they refer to the real world, predicate concepts are not contained in their subjects. Moreover, these propositions are formulated a priori i.e. they are not based on experience, but we can understand them because we can grasp the meaning of the words. "There are rational economic men" is a synthetic a priori statement [29, p. 111] because it is an a priori postulate about the real world with no empirical support. Perfect competition, the ideas of equilibrium, perfect rationality, and the theory of utility are key economic statements that are not pure analytic propositions (they are not true by definition). These propositions have been developed using a priorist (independent of experience) and synthetic (referring to the real world) methodology [60]. Let us mention that econophysicists do not reject the perfect rationality but rather the belief in reducing the complexity of human psychology to some a priorist axioms. In this perspective, econophysicists also reject the non-rational frameworks (as behavioral economics) which are based on a priorist principles about the human behaviour.

We can illustrate this perspective with the theory of utility which involves synthetic a priori propositions. Despite the concept of utility possessing empirical significance from the standpoint of subjective experience and objective manifestation (theoretical terms), there are conceptual problems with the ideas of choice and preference. As Keita [61, p. 91] explains "agents might actually choose items that he/she does not prefer" and the empirical meaning of the notion of utility presupposes implicit a priori postulates.[16] By providing propositions about the real world whose empirical meaning depends directly on the definition of the postulates, the idea of utility appears as the sum of various synthetic a priori statements. See Refs. [29,61] or Ref. [31] for further discussion of this point.

The claim that the financial markets can be studied through a Gaussian framework, is also an a priori synthetic proposition since it refers to an a priori model (independent of observations) used by economists to characterize the financial markets (the real world). As discussed above, these synthetic a priori propositions are explicitly rejected by logical positivism. That is why econophysicists insist on developing models starting with real data (a posteriori) about the financial markets (synthetic).

At first glance, it might seem that economics and econophysics share the same research topic (economic reality). However, these two fields do not consider the subject in the same way: while economics argues that the analysis of reality must a priori be micro-founded (based on a rational representative agent), econophysics presents it as a complex phenomenon (based on interactions between heterogeneous parts). The methodological gap between econophysicists and economists is huge. From this perspective, econophysics appears to be more than a new paradigm. It is a new discipline with fundamental differences from economics:

- different way of doing research (empiricism rather than a priori-ism);
- differing views about the likelihood of extreme events (instability rather than stability);
- a different kind of reductionism (interactive rather than atomistic);
- different epistemological foundations (macro- rather than micro-level);
- a different kind of causality (heteropathic rather than homopathic causality);
- a different use of the notion of a model (data-driven rather than abstract models).

This methodological gap between economists and econophysicists is stressed in the specialized literature. As Challet et al. [57, p. 14] put it, "Econophysicists are safer to ignore the lessons taught in standard economics text (both micro and macro) than to learn the economists' production ideas and take them seriously" (my italics). Dosi [62] and McCauley [10] make a similar point. Econophysicists therefore argue that their field can develop independently of economics. This willful ignorance[17] of economics results from the positivist attitude towards the synthetic a priori propositions developed by neoclassical economic theory: these statements are not scientific because they have no empirical meaning.

5. Conclusion

This paper has shown how the neopositivist approach adopted by econophysicists has created a methodological gap between econophysics and economics such that they can be considered as separate disciplines. This analysis has

[16] The axioms of completeness, transitivity and reflexivity — see Ref. [61] for further discussion.

[17] This ignorance implies that economists and econophysicists have a very different academic culture. Heterodox economists try to justify the emergence of their field by criticizing the theoretical anomalies of neoclassical economics (see, for example, Schinckus [63] about the emergence of behavioral finance). Econophysicists develop their field by ignoring neoclassical economics in order to avoid all a priori influences.

emphasized a very important empirical consequence of this, namely that economists' a priori perspective prevents them from dealing with macro and collective phenomena. Econophysicists, on the contrary, by developing a neopositivist approach, have provided several theoretical frameworks for explaining macro-phenomena. After summarizing the main features of neopositivism, I have shown that this methodological approach provides some epistemological arguments for the emergence of the econophysics. This philosophy allows neoclassical economics to be associated with a collection of synthetic a priori statements (with no empirical base). The final part of the paper has stressed the main differences between econophysics and economics that result from the neopositivist aspect of econophysics — By using this neopositivist framework, this paper emphasized the main disciplinary characteristics of econophysics which can then be considered as a new discipline.

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