

## ECONOMICS' INTERFERENCES (II) – THERMODYNAMICS

### 1. General considerations

While the relationships or interferences between Economics and Biology seems be very natural and obvious, analogous interferences between Economics and Thermodynamics appear quasi-exotic. For such prima facie assessment stay at least the following statements:

- a. Economics is a social discipline (or, maybe, science), while Thermodynamics is a natural one. So, Economics has to deal with conscious subjects (the human beings, that is, with the free will, on the one hand, and with the rationality model, on the other hand), while Thermodynamics has to deal with objects only;
- b. Economics aspires to model and predict the individual behaviour (despite the current – fortunately down sloping – enthusiasm for the probabilities, i.e. for the statistics), while Thermodynamics cannot proceed else than statistically, i.e. it can describe only the average behaviour of its own „population“ (for example, the gas molecules);
- c. the economic behaviour is driven by both the natural laws (for example, the psychologic laws) and the positive ones (for example, the fiscal rules), while the thermodynamic „behaviour“ is driven by the natural laws only.

### 2. Specific issues of Economics – Thermodynamics interferences

The interferences between Economics and Thermodynamics must be examined both from the perspective of their shared phenomena and from the perspective of their non-shared phenomena.

#### 2.1. Shared phenomena in Economics and Thermodynamics

- (a) the most obvious shared phenomenon in Economics and Thermodynamics is the statistical nature of their „populations“. Indeed, in both disciplines are studied not individuals (or not individuals only), but groups of individuals. Although both Economics and Thermodynamics can examine the individuals per se, a complete explanation of these individuals cannot be done without taking into consideration all the individuals in the group. By the contrary, for, example, Biology can study the individual physiology without considering other individuals;
- (b) both Economics and Thermodynamics „observe“ the macroscopic effects from microscopic causes. Economics can talk about the consumption behaviour at macroeconomic level, without considering the consumption of every individual at microeconomic level. Likewise, Thermodynamics can talk about temperature without considering the movement of every molecule inside a gas. We'd so talk about metaphysical<sup>1</sup> concepts which are used by both disciplines;
- (c) both Economics and Thermodynamics are led towards macro stability by the micro fluctuations. In other words, in both disciplines a macro order is generated by micro disorders<sup>2</sup>;
- (d) both fields of interest (economic processes and thermodynamic ones) are characterized by the entropic phenomenon. Of course, the entropic phenomenon is shared by the entire Universe but it manifest the more so as both fields are statistical ones;

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<sup>1</sup> Here, a metaphysical concept means a non-experimental one.

<sup>2</sup> In passing either said, this is what constitutes the crucial role of governing. Generally, all the economic theories, no matter their basic ideology, have aspired just to play such a role.

- (e) based on the statistical nature of the fields „governed” by Economics and Thermodynamics respectively, another shared phenomenon is the attractiveness of the representativeness. Indeed, both Economics and Thermodynamics require the modelling of their own population behaviour by appealing the „representative agent”. Such a „representative agent” is, of course, an average of the individuals’ behaviours;
- (f) both the fields of Economics and Thermodynamics, respectively, are under the chaotic imperative. Indeed, taking into consideration that in both fields the accuracy of measuring the initial conditions is vulnerable, then the chaotic behaviour of the populations in case is logically necessary.

## 2.2. *Un-shared phenomena in Economics and Thermodynamics*

- (a) although both the fields of Economics and Thermodynamics are entropically labelled, only in the economic field the dissipativity works. The dissipativity phenomenon is, generally, an idiosyncrasy of the life (i.e. of living entities), so it is working in the economic field because such a field is „populated” with human beings;
- (b) based on the dissipativity, the economic field is necessarily anti-equilibrium oriented<sup>3</sup>, while Thermodynamics is pro-equilibrium oriented;
- (c) Economics has to deal with individual idiosyncrasies (the human beings are different ones from others, because they are, better said, persons), that is with heterogeneities, while Thermodynamics has to deal with identical individuals, that is with homogeneities;
- (d) because the anti-equilibrium nature of the economic processes, the stability, which is associated with the equilibrium, is not principled possible in this field. Consequently, while Economics has to deal with the sustainability<sup>4</sup>, Thermodynamics has to deal with stability and even stationarity;
- (e) although, as we have seen above, both Economics and Thermodynamics face the lack of initial conditions invariance, however, while within Thermodynamics the movement law can be generally considered as constant, within Economics often the „movement law” is changing<sup>5</sup>.

## 3. **Some final (desiderative) remarks**

The most important *concept* which could be „imported” from Thermodynamics into Economics seems to be the concept of entropy (of course, in a precautionary way, that is, by combining it with the concepts of dissipativity, and sustainability)<sup>6</sup>.

The most important *process* which could be „imported” from Thermodynamics into Economics seems to be the process of „order from fluctuations”. Ideologically, such an aim requires, probably, that a new ordo-liberalism be elaborated and implemented. Moreover, I think the current processes of globalization and regional economic (and not only economic) integration imperatively require such a new social philosophy and ideology.

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<sup>3</sup> In other words (see Ilya Prigogine) the economic processes stay far from equilibrium.

<sup>4</sup> That is, a replicability without stability (much less stationarity).

<sup>5</sup> See the recent results of Behavioural Economics (for example, the Oedipus effect).

<sup>6</sup> Attention: currently, the concept of economic entropy is wrongly defined and operationalized (especially by associating it with the concept of probability, based on the work of Boltzmann and Shannon). In my opinion, the concept of economic entropy should be accurately built on the Nicholas Georgescu-Roegen suggestions.