

ECONOMICS' INTERFERENCES (III) – QUANTUM MECHANICS

1. General considerations

As it is well known, Quantum Mechanics has developed because the evidences showed that, at microscopic natural world, the established laws of the macroscopic natural world seemed to be violated. In addition, other specific natural laws were required to be accepted and formulated for the micro-world¹. So that, along with the physics of the macrocosm, a physics of microcosm has been developed. However, what connections could be made between Economics – a discipline of the macroscopic world and of a social field – and the Quantum Mechanics – a discipline of the microscopic world and of a natural field? The two disciplines seems to be at cosmic distance between them. Let's, for the beginning, put into evidence the visible differences between the two disciplines, then we turn to highlight on the invisible similitudes between them. So, the visible differences:

- as already shown, Economics is a macroscopic discipline, while Quantum Mechanics is a microscopic one. As the laws for the macroscopic world are inappropriate for the microscopic one, it seems be hazardous to put into any relation Economics and Quantum Mechanics;
- as already also shown, Economics is a social discipline, while Quantum Mechanics is a natural one. This means Economics has to do with cultural subjects which have free will, while Quantum Mechanics doesn't to have to do with subjects, but with objects only;
- Economics is rather a hermeneutics than a science², while Quantum Mechanics is an almost completely mathematized science;
- in the most part, Economics cannot enunciate predictions³, while Quantum Mechanics seems to be the most predictable among all the natural sciences by now.

As can be seen, the two disciplines seems have a vacuum intersection from the most relevant points of view. However, we'll try to show these differences are apparent only. Moreover, we'll try to show that Economics cannot afford it to ignore the Quantum Mechanics if it is wanted to reach a new stage of maturity – both theoretical and methodological – in this discipline.

2. Specific issues of Economics – Quantum Mechanics Interferences

The interferences between Economics and Quantum Mechanics 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 Quantum Mechanics*

(a) the free will

The issue of free will still remains problematic both in theology, psychology and philosophy. In theology persists the dilemma between deism and theism – if the deism is accepted, so the free will and the associated responsibility hold sense, while if the theism is accepted, so the free will and the associated responsibility disappear because God decides on all behaviours. The psychology did not yet with certainty establish if the free will is from the consciousness or, by contrary, it is a result of the unconsciousness.

¹ As it turned out shortly, even mathematics used at the macroscopic level was no longer suitable for microscopic description and explanation

² Because the principled impossibility of the factual falsifiability in the social field, so, a fortiori, in the economic field.

³ Because the presence of the free will (in our opinion, just the presence of the free will confers the quality of the complexity, which is almost generally confused with the complicatedness).

Regarding philosophy, the free will is approached from the perspective of individual freedom, being viewed as a species of it. Among all theses, the free will establishes a deep connection between Economics and Quantum Mechanics – if free will is defined as being simply unpredictability of the humans, the same unpredictability is met regarding the elementary particles. So, at least for methodological reasons, the free will can constitute a bridge between the two disciplines.

(b) the linear superposition

The linear superposition in Quantum Mechanics says that, before an experiment, an elementary particle could be in any „place“. In other words, this „place“ is a linear superposition of different possible „places“ or states, and only after the experiment is done, the „true place“/state emerges for the observer. But, the same is regarding the prediction in Economics – every individual has its own prediction on a future event, so the future event might be understood as a linear superposition of many predictions, and the true prediction can be known just after the event predicted is measured/observed. Like in the Quantum Mechanics, we have also in Economics something like of the collapsing of the „wave function“.

(c) the principle of incertitude (Heisenberg)

The principle of incertitude in Quantum Mechanics says that we cannot⁴ measure with any precision and simultaneously two conjugate parameters of a particle (usually the impulse and the position). When the precision of measuring for one parameter increases, the precision of measuring the other decreases, the two changes being embedded in Heisenberg’s formula. But the same happens in Economics regarding the vast set of trade-offs – when one of paired conjugate parameters moves in a sense, the other moves in the contrary sense, and the two changes are embedded in the associated indifference curve. So, in essence, we have also in Economics something like the principle of incertitude⁵.

(d) the interference subject – object

Closely linked to the previous common element, is the issue of the interference subject – object. Heisenberg’s incertitude emerges only if an experiment is done, so only if an interference between the observer and the object observed actually happens. Such condition, which is contingent in the Quantum Mechanics, becomes necessary in Economics – the economic phenomenology necessarily implies the interference subject –object⁶, because no economic event could come into existence without the action of a subject on an object. Again, between Quantum Mechanics and Economics can be found a significant similitude.

2.2. Non-shared phenomena in Economics and Quantum Mechanics

(a) statistical predictability

The Quantum Mechanics cannot be understood without the probabilistic modelling. Although the predictions based on the statistical average provide here exceptional corroborative results, such a modelling way seems to be inappropriate for Economics, where we have no a simple statistical population of objects, but individuals with their own values, interests and goals.

⁴ Such an impossibility is of principle, not accidentally (for example, it doesn’t depend from the accuracy of the instrument or from the competence of the observer).

⁵ Here the concept of incertitude has no the significance popularized by Knight.

⁶ In some extent, in Economics, the subject is indiscernible from the object.

(b) the factual truth

The Quantum Mechanics, despite its exotic air, remains a natural science. So, the concept of truth remains in the sphere of factual testability, that is, it remains a correspondence-truth species. By the contrary, in Economics, since it prevails the normativity in establishing the goals, the concept of truth becomes much more problematic – probably it should be viewed only as a degree in which the results are overlapping the prediction, without any connections with the factual truth in Quantum Mechanics.

Some final (desiderative) remarks

The most important *concept* which could be „imported“ from Quantum Mechanics into Economics seems to be the concept of linear superposition (of course, in a precautionary way, that is, taking into account the normativity as fundamental mark of the economic process).

The most important *process* which could be „imported“ from Quantum Mechanics into Economics seems to be the process of subject – object interference and, linked to this, the imprecision of Heisenberg (of course, in a precautionary way, because the economic trade-offs are not, in fact, a result of measurements, but a result of inter-subjects interactions).